HP StorageWorks Fast Recovery Solutions user's guide

Microsoft Exchange 2000
Microsoft SQL 2000

product version: 2.04.00

sixth edition (May 2004)

part number: B9551-96008

This guide describes how to use fast recovery solutions with Microsoft Exchange 2000 and Microsoft SQL 2000

Printed in the U.S.A.

HP StorageWorks Fast Recovery Solutions: User's Guide

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About this guide

This guide provides information about configuring and using HP StorageWorks Fast Recovery Solutions (FRS) in a Microsoft Exchange 2000 and SQL 2000 environment. FRS enables quick recovery of Exchange and SQL databases.

FRS combines database recovery features with Business Copy for use with HP disk arrays. FRS uses attributes of Business Copy to stage and manage recovery-ready databases to be used in the event of a catastrophic event. Using FRS, databases can be recovered in minutes rather than the hours typically required for a conventional restore from backup.

Unless otherwise noted, the term *disk array* refers to these disk arrays:

HP StorageWorks Disk Array XP128
HP StorageWorks Disk Array XP1024
HP Surestore Disk Array XP256
HP Surestore Disk Array XP512
HP Surestore Disk Array XP48
HP StorageWorks Virtual Array 7100
HP StorageWorks Virtual Array 7110
HP StorageWorks Virtual Array 7400
HP StorageWorks Virtual Array 7410
HP StorageWorks Enterprise Virtual Array 3000 (EVA)
HP StorageWorks Enterprise Virtual Array 5000 (EVA)

Related information For information about the disk arrays, please refer to the owner's manuals.

Prerequisite information

The instructions in this guide are intended for system administrators who have the following skills and knowledge:

- A background in direct access storage device subsystems and their basic functions
- Familiarity with disk arrays and RAID technology

  FRS configuration requires an understanding of how to configure LUNs. If you need additional expertise in configuring the array,

consulting services are available from HP. Contact your HP representative.

- Familiarity with the server operating system, including commands and utilities
- Familiarity with Exchange 2000 administration
- Familiarity with SQL 2000 administration
- Familiarity with related disk array management software programs:

  HP StorageWorks Business Copy XP
  HP StorageWorks Business Copy VA
  HP StorageWorks Business Copy EVA
  HP StorageWorks Continuous Access XP
  HP StorageWorks CommandView XP
  HP StorageWorks CommandView SDM
  HP StorageWorks CommandView EVA
  HP StorageWorks RAID Manager Library
  HP StorageWorks Secure Path

For information about related products, see the HP web site (www.hp.com) for related documentation:

HP StorageWorks LUN Configuration Manager XP: User's Guide

HP StorageWorks Business Copy XP: User's Guide

HP StorageWorks Business Copy Virtual Array: Installation and User's Guide

For Exchange 2000 and SQL 2000 information, see the Microsoft web site:

www.microsoft.com

Terminology

A more comprehensive glossary can be found at the end of this manual.

BC	HP StorageWorks Business Copy XP. BC lets you maintain up to nine local copies of logical volumes on the disk array.

CA	HP StorageWorks Continuous Access XP. CA lets you create and maintain duplicate copies of local logical volumes on a remote disk array.
cluster	The concept of linking individual servers physically and programmatically and coordinating communication between them so they can perform common tasks.
failover	The process that automatically shifts the workload from one server in a cluster to another server in the event of a failure.
P-VOL	The primary or main volume that contains the data to be copied
production server	Exchange 2000 or SQL 2000 server.
recovery server	FRS server. The server where copies of the production database are staged and managed and that runs the FRS GUI.
S-VOL	Secondary or remote volume. The copy volume that receives the data from the primary volume.
Snapclone	Secondary copies of the databases that are created using the EVA storage appliance.

Disk array firmware and software dependencies

The features and behavior of FRS depend on the disk array firmware and RAID Manager Library versions. This guide describes FRS behavior based on features implemented in the latest disk array firmware and RAID Manager Library versions.

Product	Version
XP256	52.48.06 or later
XP48/XP512	01.12.18 or later
XP128/XP1024	21.01.24 or later
RAID Manager Library XP	01.04.02 or later
VA7100/VA7400	HP13 or later
VA7410	A00 or later
EVA	VCS 3.010

Technical support

For the most current information about related products, visit the support web site:

www.hp.com/support/stressfree

For information about product availability, configuration, and connectivity, consult your HP account representative.

Revision history

December 2001	First release for Microsoft Exchange 2000.
February 2002	Revised for version 1.01. Included new GUI features. Expanded VA information. Removed examples 1 and 2; replaced with example of four storage groups with four databases each. Removed “Troubleshooting setup” section. Added errors 2401 to 2412.
July 2002	Revised for version 1.02. Included new GUI features, cluster support, and database integrity checking. Removed HORCM file dependency.
September 2002	Revised for version 1.03. Included new GUI features, one-to-many functionality, remote copy creation for XP disk arrays. Added CLI functionality. Added support for the VA7410 disk array. Revised for version 1.00 of FRS for SQL 2000.
December 2002	Revised for version 1.03.01. Includes support for EVA.
April 2003	Revised for version 1.04. Added log replay feature for Exchange 2000. Includes support for multiple Exchange 2000 databases on one LUN.
June 2003	Revised for version 2.0. Integrated FRS for Exchange and SQL Added CA functionality for SQL 2000 Added functionality for one SQL 2000 database across multiple LUNs. Added CLI functionality for SQL 2000
November 2003	Revised for version 2.01.00.

February 2004	Revised for version 2.02.00. Added information about Instant-On feature (60-day free trial) Added mount point support
March 2004	Revised for version 2.03.00. Added Chapter 5, describing HotSplit backups Added modification to CLI switches
May 2004	Revised for version 2.0.4.00. Added information about SQL recovery with log replay.

Warranty statement

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Fast Recovery Solutions features

HP StorageWorks Fast Recovery Solutions (FRS) for Exchange 2000 and FRS for SQL 2000 provides these features:

- Support for HP StorageWorks disk arrays, including the EVA, XP, and VA product families
- Fast recovery of large Microsoft Exchange 2000 and SQL 2000 databases
- Simultaneous recovery of multiple databases
- Lowest possible downtime during a corruption and database recovery
- Recovery to the last backup
- Option to replay logs
- Support for mount points for FRS-managed recovery volumes. FRS 2000 versions 2.02 and later support the use of mount points as FRS recovery LUNs. Recovery LUNs with drive letters will continue to be supported, as well as combinations of mount points and drive letters
- Database integrity checking
- Compatible with multiple backup utilities
- A single FRS server supports multiple production Exchange 2000 or multiple SQL 2000 servers
- Supports Microsoft cluster in active-passive configuration

- CLI features, including split mirror backup, integrity checking, and remote copy creation
- Remote copy creation and maintenance through the use of Continuous Access software with XP disk arrays
- Instant-On feature provides 60-day trial use of the software. After 60 days, a paid license from your HP representative is required

FRS for Exchange 2000

For Exchange 2000, FRS provides these additional features:

- Supports two backup options:

  Split mirror backup (Exchange database offline during backup, an included feature of FRS)

  HotSplit online backup (Exchange server running during backup)

The FRS concept

FRS is an array-based tool designed to enable fast recovery when Exchange 2000 and SQL 2000 databases are damaged.

FRS stages recovery-ready copies of databases through interaction with Windows 2000, the disk array, and the Exchange 2000 or SQL 2000 production server. These copies can be used in the event of damage to the production databases.

When a catastrophic event occurs, the Exchange or SQL administrator initiates the FRS process. This process takes the damaged database offline, removes it and inserts the recovery-ready copy of the database into the production server. FRS then brings the replaced production database back online and optionally replays transaction logs to make the database current as of the time of failure.

Actual time to replace the corrupt database with the recovery-ready database varies from under a minute to several minutes, depending on the size of the database and the activity on the servers and disk array.

The required starting point for the process is a known-good recovery-ready copy of the database, created by FRS.

FRS is valuable to enterprises with requirements such as these:

- High availability requirements for their large, centralized Exchange 2000 or SQL 2000 environments
- Those seeking to improve the SLA (Service Level Agreement) they are able to offer
- Those who have experienced significant loss due to downtime of their Exchange 2000 or SQL 2000 databases

FRS and the total HP high-availability solution

HP provides a total high-availability solution package from high-end storage to software and support. Fast Recovery Solutions is part of the high-availability offering, which includes:

- Disk arrays
- HP StorageWorks Business Copy XP
- HP StorageWorks Business Copy VA
- HP StorageWorks Business Copy EVA
- HP StorageWorks Continuous Access XP
- HP StorageWorks RAID Manager Library XP
- CommandView SDM
- CommandView XP
- CommandView EVA
- Fast Recovery Solutions
- Servers and software
- Storage consulting services
- Post-sales total solution support

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Prerequisites and limitations

This chapter pertains to both Exchange 2000 and SQL 2000. The following items are described in this chapter:

- Hardware/software checklist
- Server architecture for FRS
- Infrastructure requirements
  - for use with split mirror (offline) backup
  - for use with online backup
- XP LUN configuration
- VA LUN configuration
- EVA LUN configuration
- Windows 2000 disk configuration
- *(Exchange 2000 only)* Exchange 2000 server configuration
- *(SQL 2000 only)* SQL 2000 server configuration
- Integrity checking requirements
- Remote copy requirements
- Limitations

Hardware/software checklist

Required for FRS with either Exchange 2000 or SQL 2000

- ❒ Disk array
- ❒ *(VA/XP only)* HP StorageWorks Business Copy software
- ❒ *(EVA only)* HP StorageWorks Secure Path software
- ❒ *(VA only)* CommandView SDM
- ❒ *(EVA only)* CommandView EVA
- ❒ *(XP only)* RAID Manager Library
- ❒ Microsoft Windows 2000 Advanced Server
- ❒ Microsoft Windows 2000 service pack 4
- ❒ Tape drive for backup. Not needed if using an offline backup, or if backing up to disk.

Required for FRS with Exchange 2000

- ❒ Microsoft Exchange 2000
- ❒ Microsoft Exchange 2000 service pack 3
- ❒ Backup tool – supports two options:

  Any online backup utility that interfaces with the Exchange 2000 API

  An offline “split mirror” backup (function included with FRS)

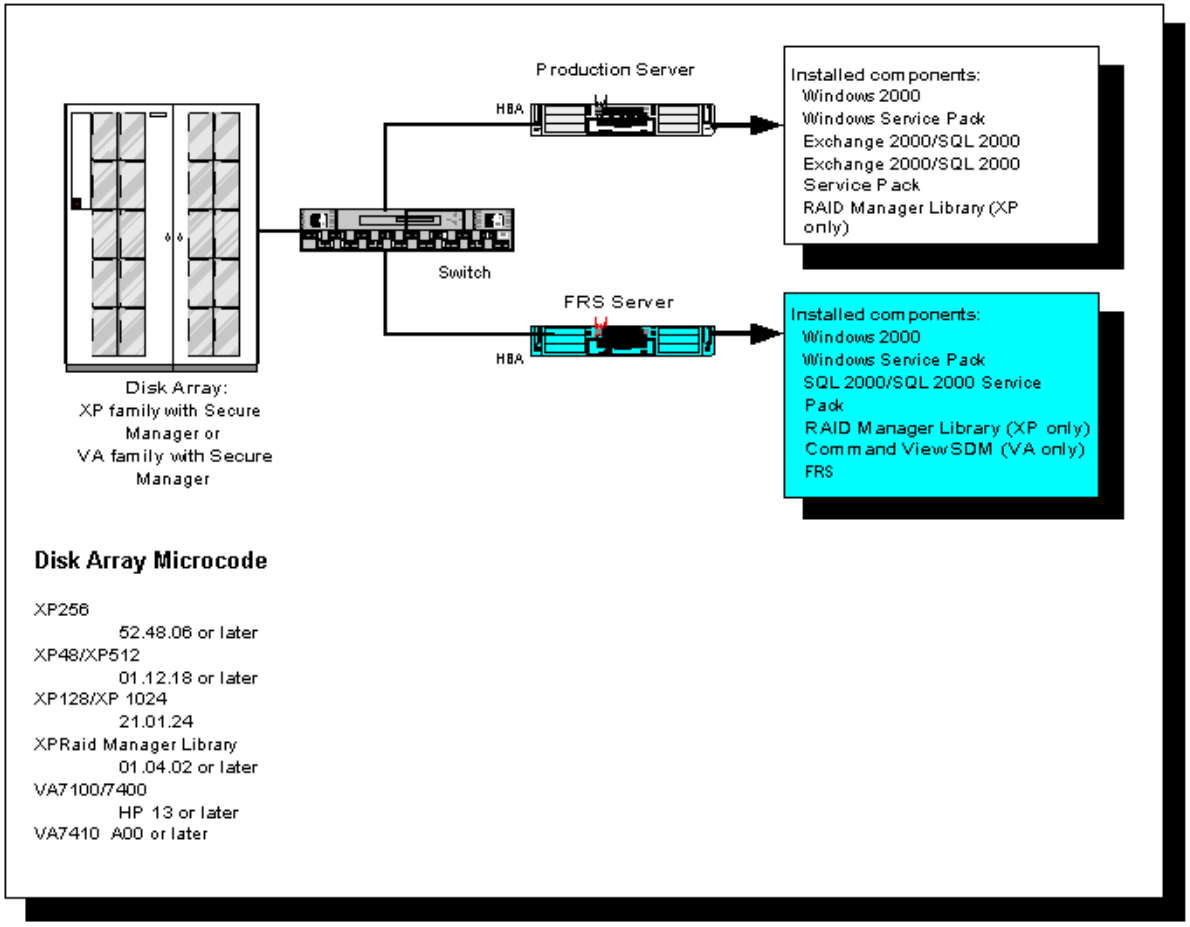
Required for FRS with SQL 2000

- ❒ SQL 2000 Server
- ❒ SQL 2000 service pack 3

Server architecture for FRS

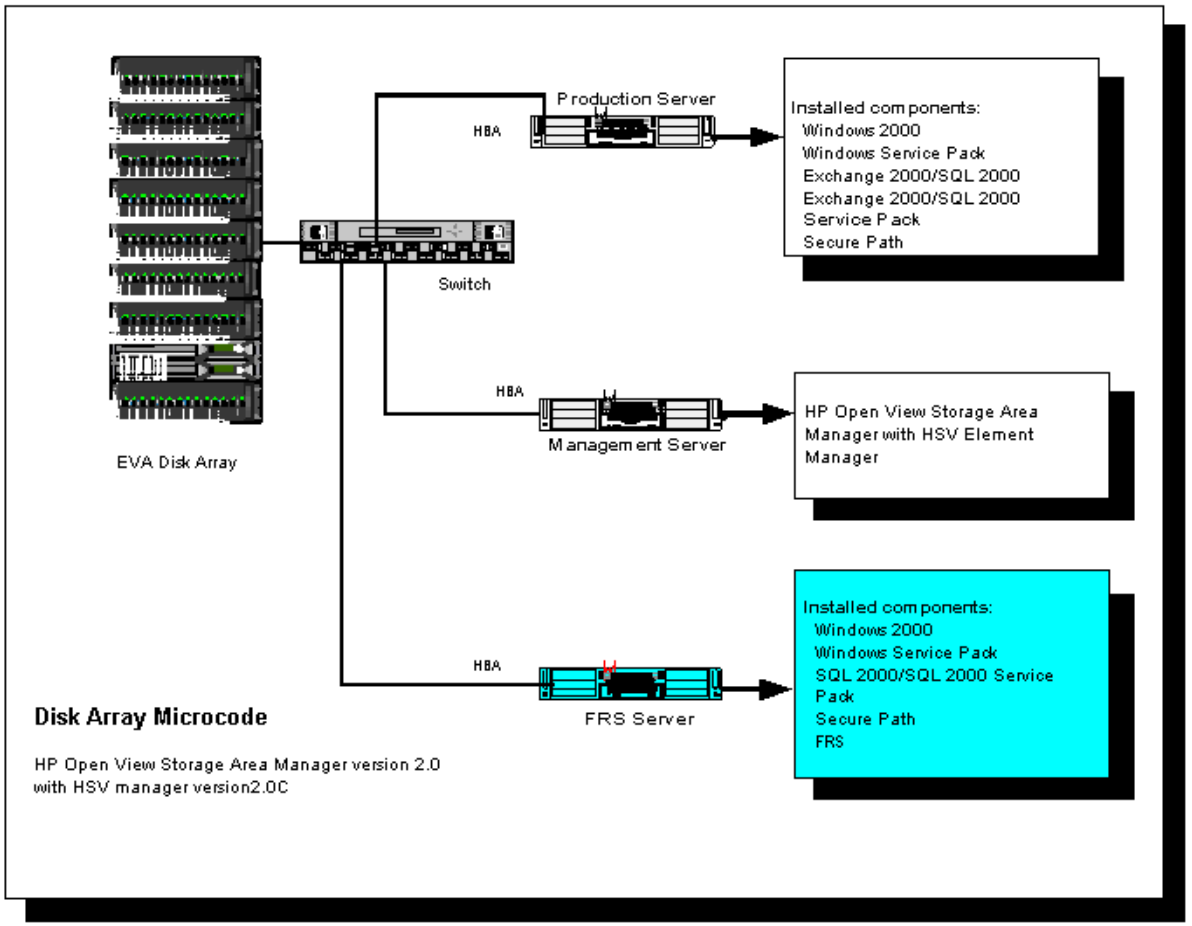
XP or VA disk array

A possible architecture for using FRS with an XP or VA disk array is shown below with disk array microcode requirements.



EVA disk array

A possible architecture for using FRS with an EVA disk array is shown below.



Infrastructure requirements

For use with split mirror backup for both Exchange 2000 and SQL 2000

Installation of FRS when using split mirror backup requires one server to act as the recovery FRS management station. The FRS GUI runs from this server to stage the recovery-ready copies of the database to use in the event a fast recovery is needed.

This server can be a standalone workstation, can be joined to the production domain, or it can be a member of its own domain. The only requirement is that it be on the same network as the production servers it will manage.

Prepare the recovery server by installing Windows 2000 Advanced Server, Windows 2000 service pack 4, RAID Manager Library (XP only), CommandView SDM (VA only), Secure Manager VA (VA only), Secure Path (EVA only) and the recovery server component of FRS. (More information about installation is in the installation chapter of this manual.)

For a VA disk array, there must be one CommandView SDM management station. Installation of CommandView SDM on the server is not required, provided there is a management station that has the ability to create and manage the VA disk array LUNs.

For use with online backup *(FRS for Exchange 2000 only)*

FRS requires a separate domain to host the recovery server because duplicate Exchange 2000 servers are not allowed in the same domain. The production domain must already be in place and functioning as an active Exchange 2000 server providing messaging services to customers.

A recovery domain must be created (where FRS works, staging copies of the Exchange 2000 databases for use in the event of corruption of the production databases).

The recovery domain consists of one server which acts as the Active Directory server. This servers must have the following software installed:

Windows 2000 Advanced Server, Windows 2000 service pack 4 or later, Exchange 2000, RAID Manager Library (XP only), CommandView SDM (VA only), Secure Manager VA (VA only), Secure Path (EVA only), the online backup utility being used, and FRS.

There are additional benefits to having a separate domain functioning as the FRS recovery domain, such as individual mailbox recovery. These actions are not part of the FRS functionality, but a beneficial side effect of having an Exchange 2000 FRS recovery domain.

XP disk array LUN configuration

LUNs must be configured on the XP disk array for use by the recovery server.

If you use the remote copy option of FRS, use Continuous Access XP to create the pairs (production LUNs paired to remote recovery LUNs). After these pairs are manually created, FRS will see them.

If you are using the integrity check/safe copy feature of FRS, add two recovery LUNs for each production LUN, rather than one. One copy will be used as a recovery-ready, known good database. The other copy will be the "pending" copy. Integrity checks are run against it before it is promoted to the recovery-ready copy. The roles of these two recovery LUNs flip-flop so that there is always a known good recovery LUN.

In addition, there must also be a small disk designated as the command device. The command device must be a minimum of 36 MB and cannot be a LUSE volume. This is a dual (or more) assigned drive which controls communication between the disk array and the servers. The recovery server, as well as each of the production Exchange 2000 or SQL 2000 servers, must have access to the command device. Only one command device is needed for multiple exchange servers.

Exchange 2000

For Exchange 2000, each database can reside on its own LUN. Additionally, multiple databases or all databases within a storage group may reside together on one LUN. Recovery server LUNs must be of the same size as the production server LUNs.

Example If all databases in the first storage group reside on one OPEN-M*4 LUN, an OPEN-M*4 LUN for recovery must be created and presented to the recovery server. If each of four databases within the first storage group resides on a separate OPEN-M LUN, four OPEN-M LUNs must be created for recovery and presented to the recovery server.

SQL 2000

For each SQL 2000 production database, there must be a corresponding recovery LUN of identical size. All supported SQL 2000 configurations are supported by FRS as long as all portions of database files and log files reside on a supported HP disk array.

Related information *HP StorageWorks LUN Configuration Manager XP: User's Guide* has information about configuring LUNs.

VA disk array LUN configuration

The following pre-configuration of the VA disk array is required:

For VA disk arrays, you must use CommandView SDM software to create the initial business copies on the recovery server. Assign LUN 0 write-configure access to each of the recovery and production servers. LUN 0 acts as a command device, and FRS cannot function unless all servers have access to it.

Using CommandView, create business copies for each production LUN to be managed by FRS. If you are using the integrity check/safe copy feature of FRS, create two business copies for each production LUN rather than one.

Security must be enabled. Configure the security table through CommandView SDM so that LUNs are seen only by the correct host. The FRS servers should see only LUN 0 and the business copies. The production server should see only LUN 0 and the production LUNs.

In assigning security, you must use the *node* worldwide name of the HBA. FRS will not function properly if the *port* worldwide name is used.

In the Business Copy screen of CommandView, highlight each newly created business copy and click on Copy From Parent. This action copies the production data onto the recovery LUNs and is the required starting point for FRS.

Creating remote copies is not available as a feature on VA disk arrays.

Related information

HP StorageWorks Virtual Array: Installation Manual provides information about configuring the LUNs with CommandView.

EVA disk array LUN configuration

Configure LUNs on the disk array for use by the recovery server. For each Exchange 2000 and SQL 2000 production database, there must be a corresponding LUN of identical size for recovery.

If using the integrity check/safe copy feature of FRS, add two recovery LUNs for each production LUN, rather than one. One copy is used as a recovery-ready, known good database. The other copy is the pending copy. Integrity checks are run against the pending copy before promoting it to the recovery-ready copy. The roles of these two recovery LUNs flip-flop to ensure that there is always a known good recovery LUN available.

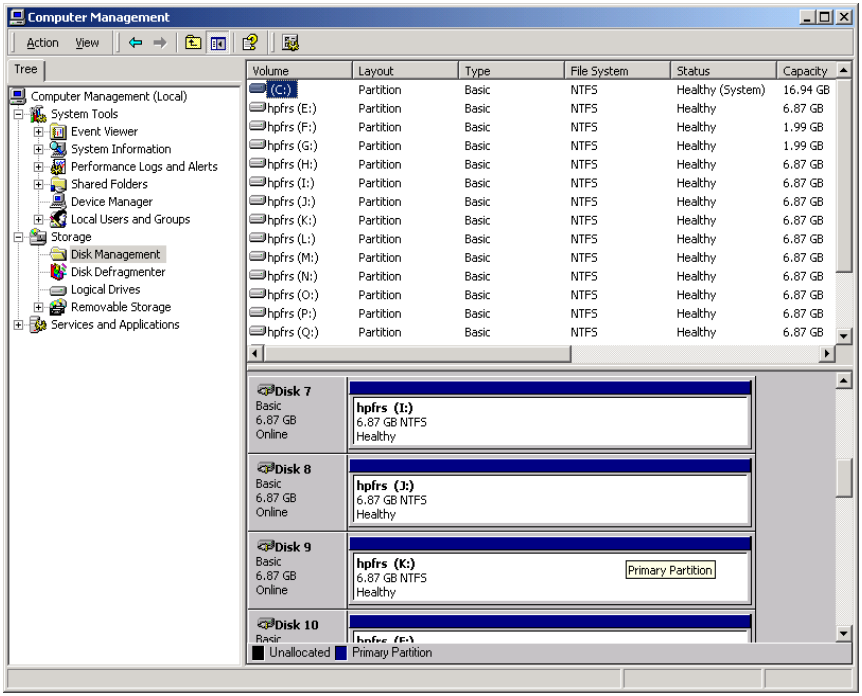
The recovery LUNs may be created by using the Snapclone feature of the EVA array. Again, if you are using the integrity check/safe copy option of FRS, create two Snapclones for each production database. Otherwise, only one Snapclone is required for each production database.

Windows disk configuration for the recovery server

XP family

In disk management, format the newly created recovery LUNs. Disks must remain in basic configuration. Dynamic disks are not supported.

Each disk must be formatted with the volume label **hpfrs** and either a drive letter (as shown below) or as a mount point. This allows FRS to recognize disks designated as recovery disks.



When using the integrity check/safe copy feature of FRS, format two recovery LUNs in this way for each production LUN managed by FRS.

When using the remote copy option, use CA to create the local/remote pair. After these pairs have been established, FRS will see them and display additional GUI features for their management. The remote pair can be

created at any time. If pairs already exist, FRS will see them. If pairs are created after FRS has already been installed, a refresh of the GUI will show them.

VA family

Because CommandView SDM was used to make a copy from the parent, when the disks are rescanned, the report shows formatted and labeled disks. No further configuration is needed in Windows.

1. From Window Disk Management on the recovery server, execute a rescan of the disks.
2. Confirm that all Business Copy disks are displayed and have the appropriate format.
3. Confirm that LUN 0 is accessible to all FRS and production servers and has been given write-configure access.

EVA family

The storage appliance has already been used to create either one or two copies of each of the production databases. See “EVA disk array LUN configuration” (page 28). In Windows Explorer, rename the newly created recovery LUNs. Each disk must be renamed with the volume label **hpfrs.** This allows FRS to recognize disks you have designated as recovery disks.

If you are using the integrity check/safe copy feature of FRS, you must rename two recovery LUNs this way for each production LUN managed by FRS.

Exchange 2000 configuration

FRS works with Exchange 2000 in any storage groups and databases that fall within the supported limits of Exchange 2000. Configurations can range from one storage group supporting one database to four storage groups each supporting four databases.

The streaming and **.edb** files for each database cannot reside on separate LUNs. Each database with its streaming and **.edb** files must reside on one LUN, or multiple databases in a storage group can reside on one LUN.

If multiple databases reside on one LUN, all databases on that LUN must be dismounted for maintenance of any one of the databases.

If log replay is required, the Exchange 2000 databases must have circular logging turned off. FRS cannot replay logs if circular logging is turned on.

Tip If you are creating a separate domain (for example, for an online backup), Exchange 2000 can be configured on the FRS recovery domain as well. This enables other benefits, such as creating further mirrors of the data and individual mailbox recovery. These features are not features of FRS, but would be possible if the FRS recovery domain is a functional Exchange 2000 server. If Exchange 2000 is installed and configured on the FRS recovery server, it must be configured identically to the Exchange 2000 production server.

SQL 2000 configuration

FRS SQL works with SQL 2000 within the supported limits of SQL 2000, except for the following:

- Service pack 3 for SQL 2000 is required for FRS

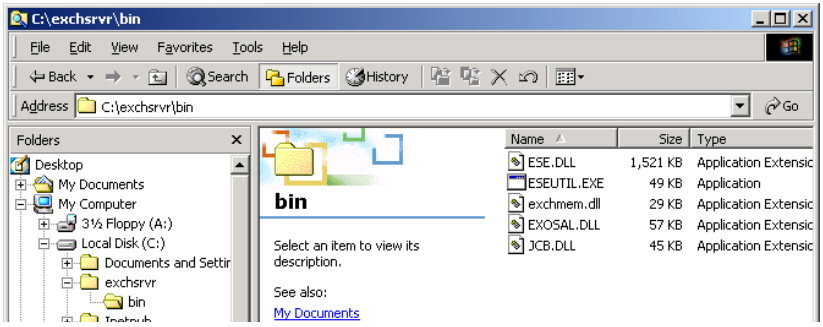
Requirements for integrity checks

Exchange 2000

The integrity check feature of FRS uses ESEUTIL, a Microsoft Exchange 2000 utility that checks for logical and physical corruption. FRS uses the **ESEUTIL\g** option, which is a reporting tool only. No changes are made to the database in the course of the check. The ESEUTIL files must be moved to the recovery server to enable the FRS integrity check feature.

1. On the FRS server, create an **exchsrvr** folder on the root drive.
2. Within the **exchsrvr** folder, create a **bin** folder.
3. On the Exchange production server, locate the **Exchsrvr/bin** directory. Copy the following files to the newly created **exchsrvr/bin** directory on the FRS server:

   Eseutil.exe
   Ese.dll
   Jcb.dll
   Exosal.dll
   Exchmem.dll



Related information Microsoft article Q244525, "How to run ESEUTIL on a computer without Exchange server," outlines the process in detail.

SQL 2000

The integrity check feature of FRS for SQL utilizes DBCC (database consistency check). To use this feature, SQL Server must be installed on the recovery server. If SQL Server is not installed on the recovery FRS server, no integrity check options appear for those FRS-managed SQL databases appearing in the FRS GUI.

Remote copy requirements for the XP disk array

The remote copy function is available only for XP disk arrays.

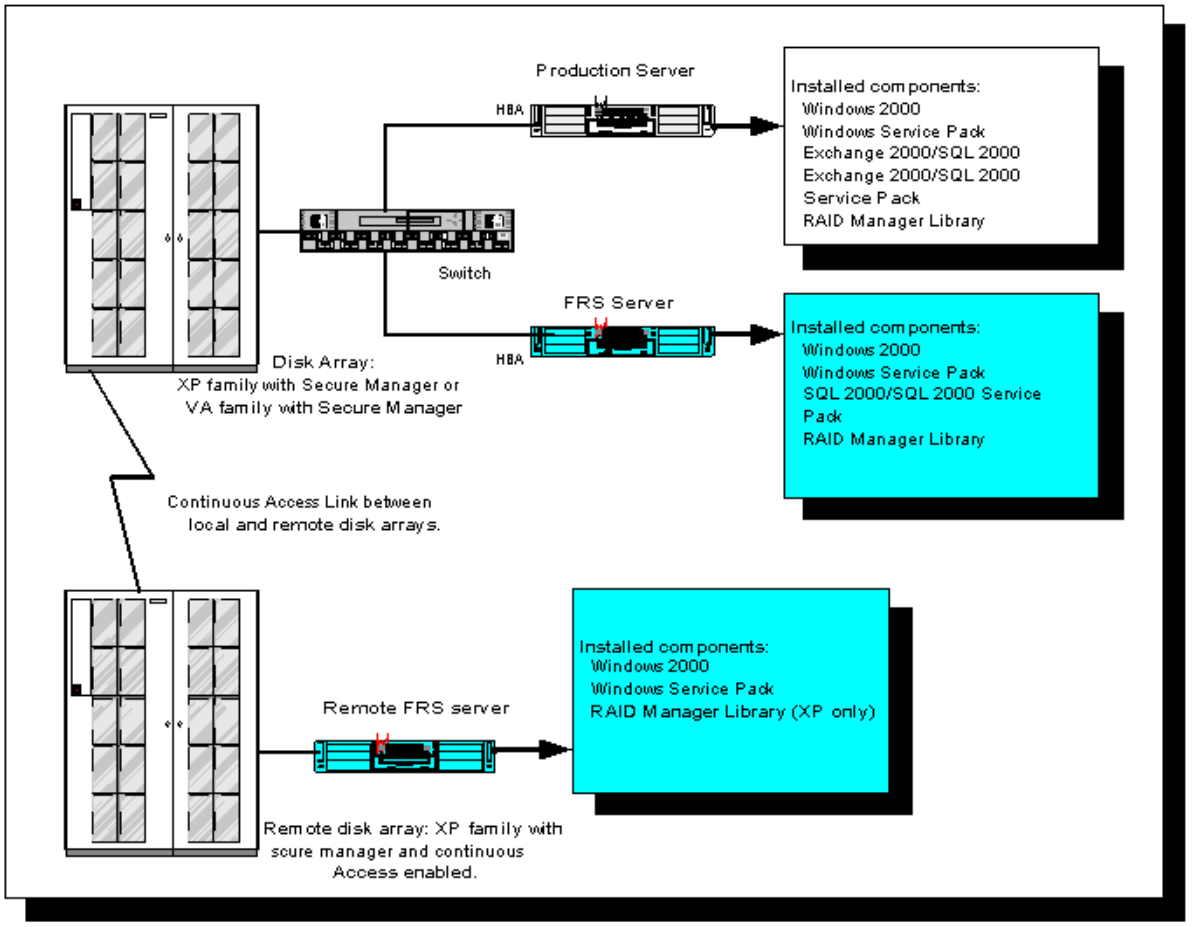
After creating a local recovery LUN, you can create additional copies of the databases on remote disk arrays for disaster recovery purposes. For each local recovery LUN managed by FRS, there can be one remote LUN managed by FRS. The following requirements apply:

- A remote server must be connected to the remote disk array that will host the remote copies
- Both the local and remote disk arrays must have Continuous Access software installed
- The initial pair between the local recovery LUN and the remote recovery LUN must be created manually as a starting point
- A reboot may be required after initial creation of the local/remote pair
- Just as you need to do an initial FRS split mirror backup to the local recovery LUNs, you need to execute an initial FRS split mirror backup to the remote recovery LUNs
- The Remote Copy portion of FRS must be installed on the remote server
- The remote server must have a command device on the array

For information about how to install the remote server, see “Installation” (page 39).

For information about how to use the remote copy features, see “Using the remote copy feature” (page 60).

The figure below shows the relationship between the local and remote disk arrays for the remote copy feature of FRS.



Limitations

FRS is supported with basic disk configuration only. Dynamic disks are not supported. FRS supports a database on a single LUN only. LUSE can be used to create a large LUN; however, spanning LUNs in Windows is not supported because dynamic disks are not supported.

Only one instance of FRS can be running at any given time on one recovery server. If more than one instance of FRS is running, data can become corrupted (for example, if FRS is running on the recovery server and another administrator uses a remote access tool such as Terminal Services to access the same instance of FRS).

Exchange 2000

FRS works within all the supported limitations of Exchange 2000 with the following exceptions:

- The streaming and **.edb** files must reside together on the same LUN
- Log files cannot reside on the database LUN
- Log replay is unavailable when circular logging is enabled

SQL 2000

FRS works within the supported limitations of SQL 2000 with the following exceptions:

- Service pack 3 for SQL 2000 is required

3

Installation

Before installing FRS, do the following. These tasks must be done so that FRS can function properly.

- *(XP only)* Install RAID Manager Library on both the production and recovery servers.
- *(XP only)* Provide the production and recovery servers access to a command device on the disk array.
- Ensure the Exchange mailbox stores and SQL databases with log files reside on the disk array LUNs.
- *(VA only)* Provide the production and recovery servers access to LUN zero.
- *(XP only)* Configure Recovery LUNs of appropriate size using the label **hpfrs**.
- *(VA only)* Set up a CommandView SDM station that gives access to VA LUN management.
- *(VA only)* Use CommandView SDM to create the initial pair and do an initial Copy From Parent.
- Configure additional recovery LUNs for use in doing integrity checks (if using the integrity check/safe copy feature).

- *(Exchange 2000 only)* Move ESEUTIL files to the recovery server (if using the integrity check feature).
- *(SQL 2000 only)* Install SQL 2000 on the recovery server (if using the integrity check feature).
- *(VA only)* Configure the security table for the VA using the node worldwide name (use of port WWN is not supported).
- *(XP only)* If you are using a switched environment, configure Secure Manager for access by hosts to LUNs.
- *(EVA only)* Install Secure Path on the production and recovery servers.
- *(EVA only)* Provide network connectivity between the appliance, recovery servers, and all production servers.

Installing the production and FRS servers

Both Exchange 2000 and SQL 2000

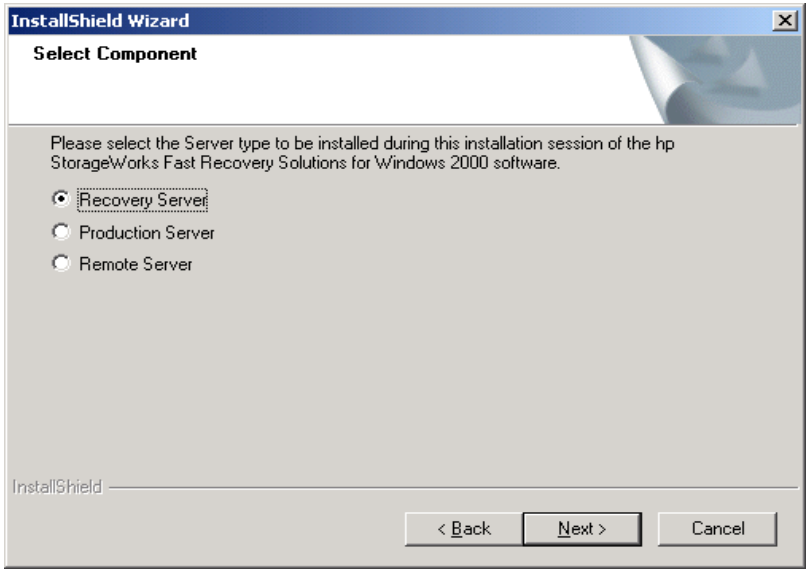
Installation of SQL or Exchange 2000 for each server is identical with the exception of the Select Component screen. Follow this procedure for each of the recovery, production, and remote servers.

If you are installing FRS into a cluster environment, treat each node as a production server, and install FRS on both nodes.

Open the FRS CD and execute the **setup.exe** file to launch the installation wizard.

On the Select Components screen, choose the appropriate component to install: production, recovery, or remote server. In a cluster environment, the production component is installed on each of the cluster nodes.

Exchange 2000



DCOM configuration

FRS offers to launch DCOM Configuration online help before launching DCOM configuration. The help facility describes the steps required for configuring DCOM, including screen samples. The installation steps are also presented below.

After FRS launches the DCOM configuration properties:

1. Select **hpfrscdo.FrxDiskManager** from the list of applications and open **Properties**.
2. Select the **Security** tab.
3. Select **Use custom access permissions**; then click **Edit**.
4. Click **Add** and scroll down to **Everyone** on the users list.
   Click **Add**.
   Click **OK**.
   Click **OK** again.
5. Select **Use custom launch permissions**; then click **Edit**.
6. Click **Add** and scroll down to **Everyone** on the users list.
   Click **Add**.
   Click **OK**.
   Click **OK** again.
7. Click **Use default configuration permissions** at the bottom of the **hpfrscdo.FrxDiskManager Properties** window.
8. Select the **Identity** tab.
9. Select **This User**.
10. Select **Browser**.
11. Select **Administrator**.
    Click **Add**.
    Click **OK**.
12. Enter the administrator's password.
13. Re-enter the administrator's password and click **OK**.
14. Click **Add.** Click **OK**.

15. Click **Apply** and **OK** until you exit from the DCOM configuration window.

    Upon completion of DCOM configuration, the installer returns to the FRS installation window.

16. Click **Finish** to complete installation.

Repeat this procedure for each production or recovery server.

Uninstalling FRS

Uninstalling FRS can be done in one of two ways: either through using the FRS CD or through Add/Remove Programs in the Windows Control Panel.

With either method, the uninstall script prompts you to remove FRS from the system.

To uninstall FRS with the CD:

Open the contents of the FRS CD. Click **setup.exe** to launch the uninstall script.

To uninstall by using Add/Remove Programs:

From the **Start** menu, select **Settings**, select **Control Panel**, and open **Add/Remove Programs**.

Find the HP FRS entry and select it. Click **Change/Remove** to launch the uninstall script.

Upgrading from a previous version of FRS

If a previous version of FRS was installed, the current version of FRS automatically prompts you to do a “modify” upon installation. Doing a modify will retain all previous FRS pairings and recovery-ready status.

If you uninstall the old version of FRS completely before installing the current FRS version, previous FRS pairs will not be recognized and you will need to do an FRS split mirror backup again to put the databases back into “recovery-ready” status.

If there are no configuration changes to Exchange 2000 or the Windows disk management system, no configuration changes are needed after an upgrade.

4

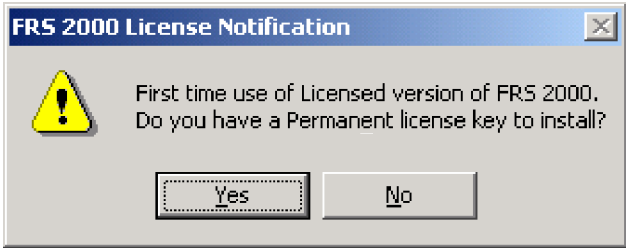
Using FRS

The following items are described in this chapter:

- User interface
- Maintenance/using the split mirror backup function
- Using the remote copy feature
- Checking integrity
- Automatic integrity check after split mirror backup
- Executing a recovery
- Using the Command Line Interface
- Options

User interface

The first time you start FRS, the license notification window displays.



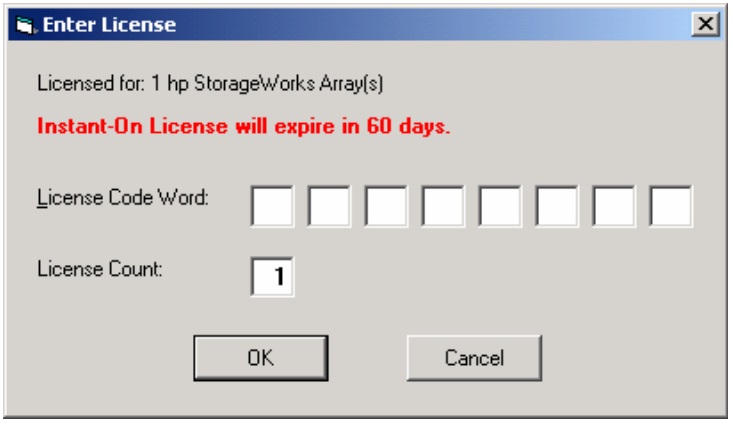
Click **Yes** if you have a purchased license, or **No** to continue using the 60-day trial version of FRS with Instant-On capability. If you are using the 60-day trial version, FRS will manage only one disk array.

If you are using the 60-day Instant-On trial:

If you are using the 60-day Instant-On trial, click **No**. The Select Server window opens. Continue with step 3 of the procedure below.

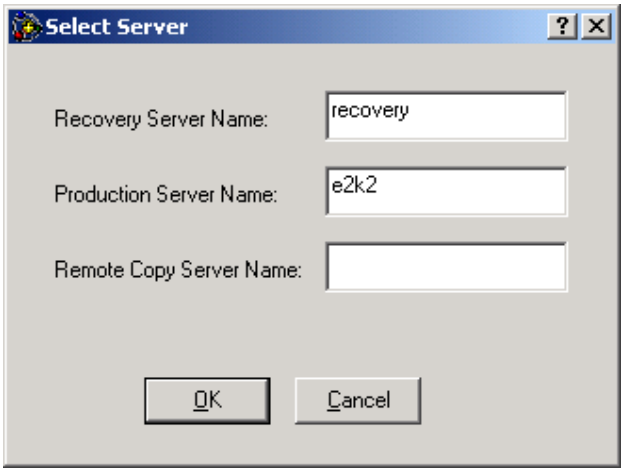
If you have a permanent license:

1. If you have a permanent license, click **Yes**. The Enter License window opens.



2. Enter the license code word.

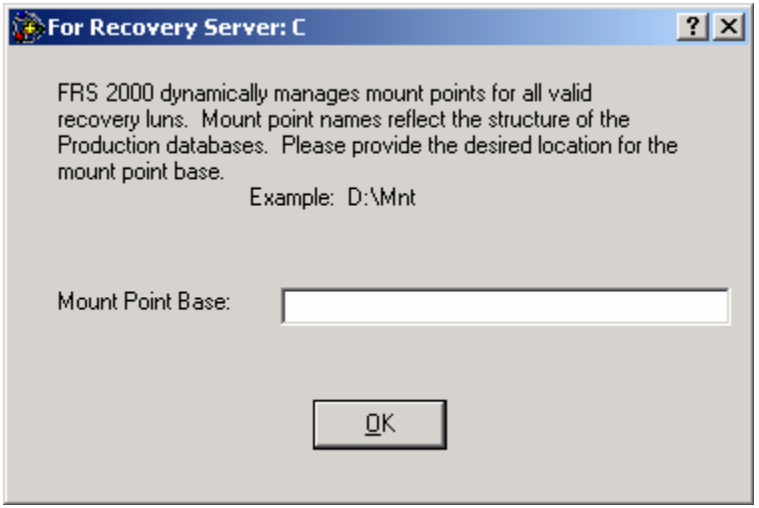
3. Enter the license count. The number depends on how many licenses were purchased and how many arrays will be managed.
4. Click **OK**. The Select Server window opens.



5. Enter the name of the recovery server.
6. Enter the name of one of the production servers to display the graphical user interface (GUI). If the production server is set up as part of a clustered environment, enter the virtual server name as the production server name.

XP disk arrays only (optional)

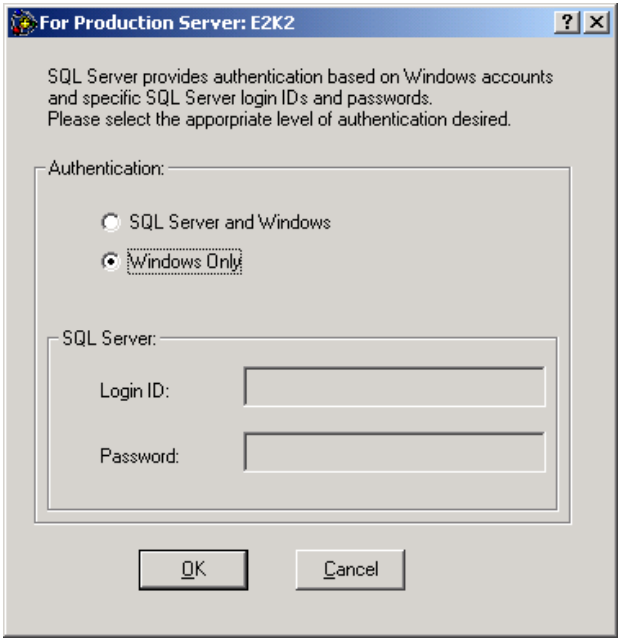
7. If you are using the remote copy feature of FRS, also enter the name of the remote copy server. If you are not using the remote copy feature, leave this field blank.
8. Click **OK**.



FRS prompts you to enter a "mount point base." This is the location where FRS keeps track of the servers and databases being managed. The mount point base can be any NTFS formatted drive where mount points can be specified, such as the root drive, or any external storage drive. You must specify a mount point base.

9. Enter a mount point base and click **OK**.

SQL only An authentication type window opens.

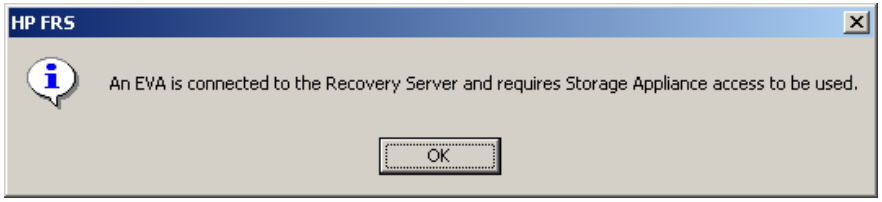


10. Select either “Windows Only” or “SQL Server and Windows” authentication.

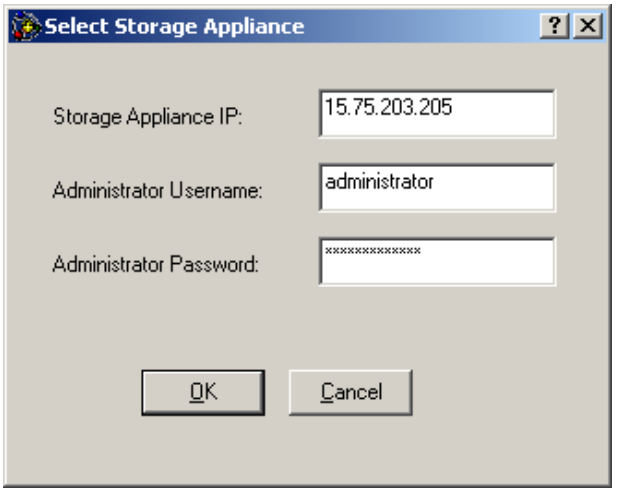
    If you select SQL authentication, enter the SQL server login ID and password.

11. Click **OK**.

EVA only For an enterprise Virtual Array (EVA), FRS displays the message:

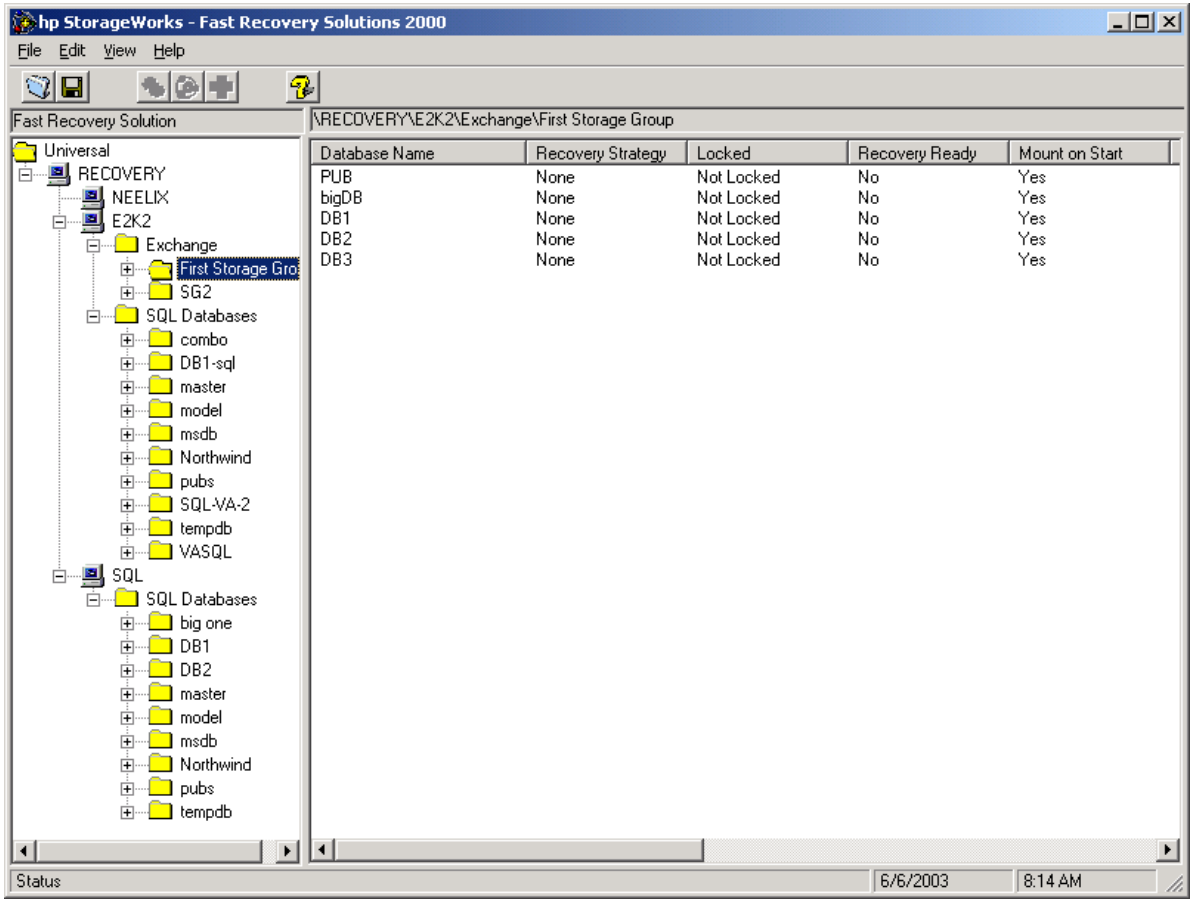


12. Click **OK**. The Select Storage Appliance message window opens.



13. Enter the IP address, administrator user name, and the password for the EVA storage appliance. Click **OK**.

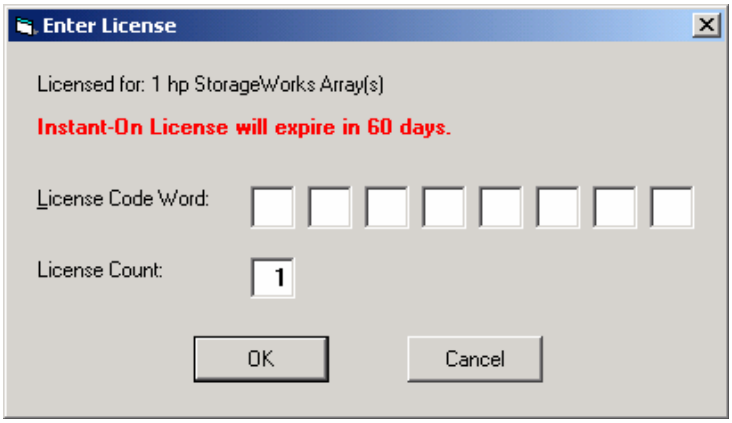
To add more production servers or a remote server to the GUI, select **File > Open server** to access the Select Server screen. The following illustration shows that the remote server “neelix” and the SQL server, “SQL” have been added.



The window displays the production configuration in the left panel. The right panel displays information about any component you highlight in the left panel. When a database is highlighted, (as shown above) information is displayed in the right panel for the database's production and recovery LUNs, as well as date and time information for integrity checks, last backup, and last recovery.

Adding a permanent license for FRS

1. Select **File > Add license** from the FRS main window. The Enter License window opens.



2. Enter the license code word.
3. Enter the license count. The number depends on how many licenses were purchased and how many arrays will be managed.
4. Click **OK**.

First-time split mirror backups

EVA and XP disk arrays

The first time FRS is installed and started, the Recover button will not be enabled and the database's status displays this message:

```
No Recovery LUN Available
```

You must do a split mirror backup for each database at least once (using FRS) in order for FRS to see a recovery-ready LUN. After this first-time split mirror backup, you can update the recovery LUN by an online backup, or update it by continued use of the FRS split mirror backup feature, or update it by a combination of both.

For information about the Integrity Check box, see "Checking integrity" (page 63).

VA disk arrays

As described in "VA disk array LUN configuration" (page 27), CommandView SDM has already been used to create the initial business copy and "Copy From Parent." Therefore, the databases configuration section of the GUI displays the LUN information from the LUNs that received business copies.

When FRS is first opened and configured, the recovery LUN is designated. This designated LUN does not become recovery-ready until FRS executes a split mirror backup.

Maintenance/Using the split mirror backup feature

The time required to execute the first-time split mirror backup is longer than the time required for subsequent splits. During the initial split mirror backup with FRS, the pair is created. Subsequent split mirror backups only resynchronize the pair and thus require less time.

Whether using an EVA, XP or VA disk array, the first time FRS is started, you must create a pair affinity for each database. Even if online backups will be used in the course of normal maintenance, this pair must be created once to set up the relationship between production and recovery LUNs (between the primary and secondary volumes). This initial pair must be created by using FRS.

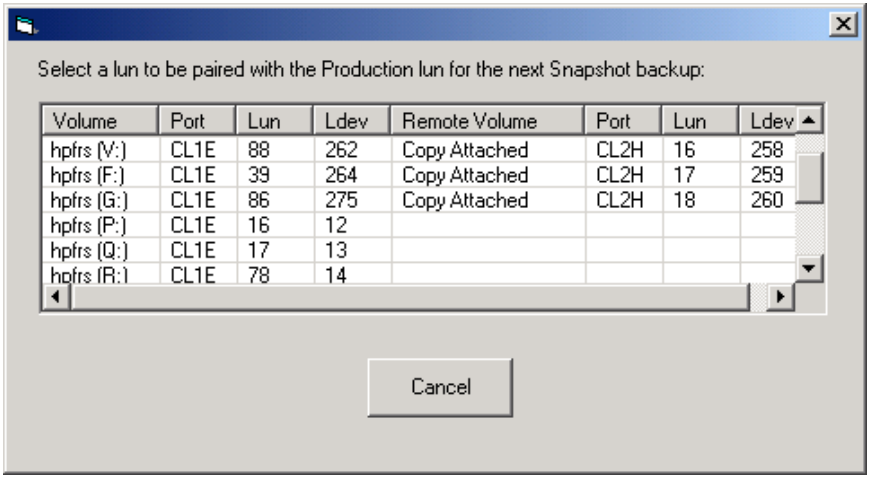
EVA and XP disk arrays

1. Select the database to be backed up on the left panel of the FRS GUI. The Database Configuration section of the GUI displays the production LUN information. The first time that FRS is used, FRS displays this message:

   ```
   No Recovery LUN Available
   ```

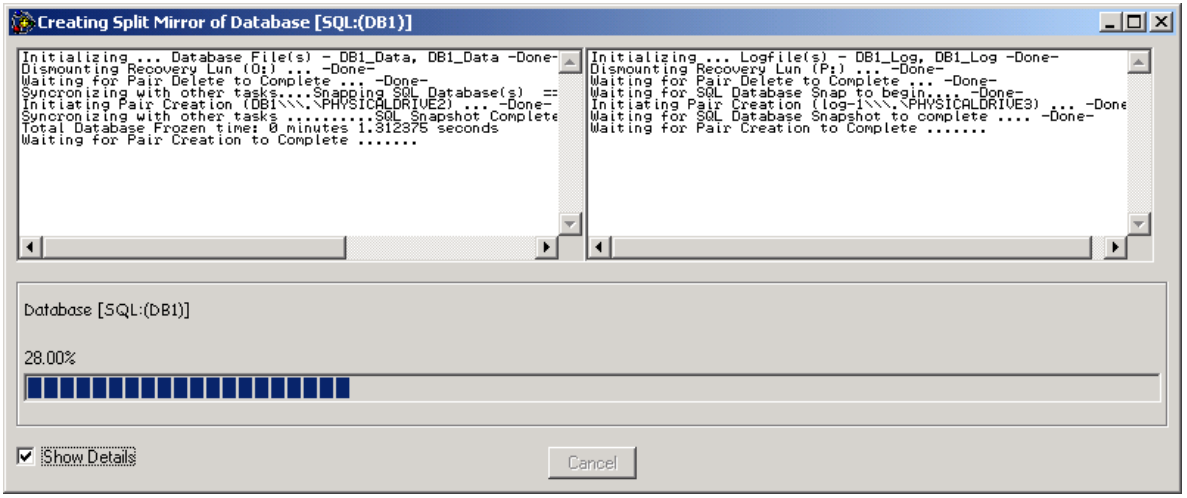
2. Click Split Mirror Backup.

   A LUN selection box pops up and prompts you to choose from a list of available like-sized LUNs. This list is based on the LUNs that were previously formatted with the HPFRS label. For XP, the list indicates whether any remote copy is attached. If you choose LUNs with a remote copy, additional GUI options appear to automatically update the remote copy each time a local split mirror backup is executed.

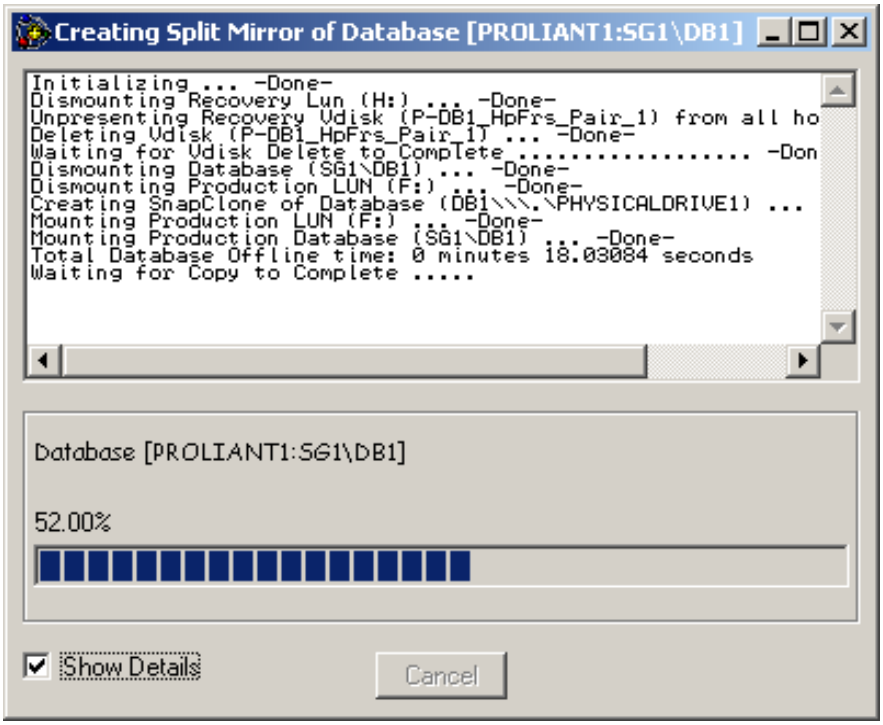


3. Choose one of these possible recovery LUNs. Click **OK** to proceed with the split mirror backup.

The following example shows a progress window for a SQL 2000 database on an XP disk array: FRS displays the progress of actions as they occur during the pair creation:



The following example shows a split mirror backup progress window when using an EVA disk array:



Subsequent split mirror backups require no LUN selection because the LUNs have already been designated.

VA disk arrays

For VA disk arrays, CommandView SDM should have been used previously to create the initial business copy and copy from parent. The FRS database configuration section displays information for the Business Copy LUNs. Start the split mirror backup as follows:

1. Highlight the database.
2. Click **Split Mirror Backup**. The backup starts, and its progress is displayed.

All Disk Arrays

When the production database is remounted, production is back online and the Exchange 2000 or SQL 2000 databases are accessible by users. The progress window displays how long the production database was inaccessible. The time from initiating the backup to coming back online varies depending on the size of the database, whether an initial setup or subsequent maintenance backup is being performed, and other activity taking place at that time on the array.

You can perform backups on multiple databases by beginning them serially. HP recommends that you limit the number of backup/recovery processes to 5 at one time. Consult your HP representative to optimize performance for your particular configuration.

Perform backups as often as needed and as often as scheduled downtime allows. This serves to create the shortest possible window of potential loss if a corruption occurs that necessitates using FRS to restore data.

When you use the integrity check/safe copy feature of FRS, the administrator must view the integrity check. If the administrator doesn't find any database corruption, accept the result as a good copy.

After you accept the integrity checked version, it is promoted to recovery LUN status and displayed in the GUI. When a second split mirror backup is done, you need to choose a second LUN. FRS retains the first known good copy as the recovery LUN until you view and accept the second LUN's integrity check.

If you do not use the integrity check/safe copy feature of FRS (the Integrity Check box is not enabled), only one recovery LUN is consumed per production LUN, and newly backed up LUNs are automatically promoted to recovery LUN status.

For more information about integrity checking, see "Checking integrity" (page 63).

Using the remote copy feature

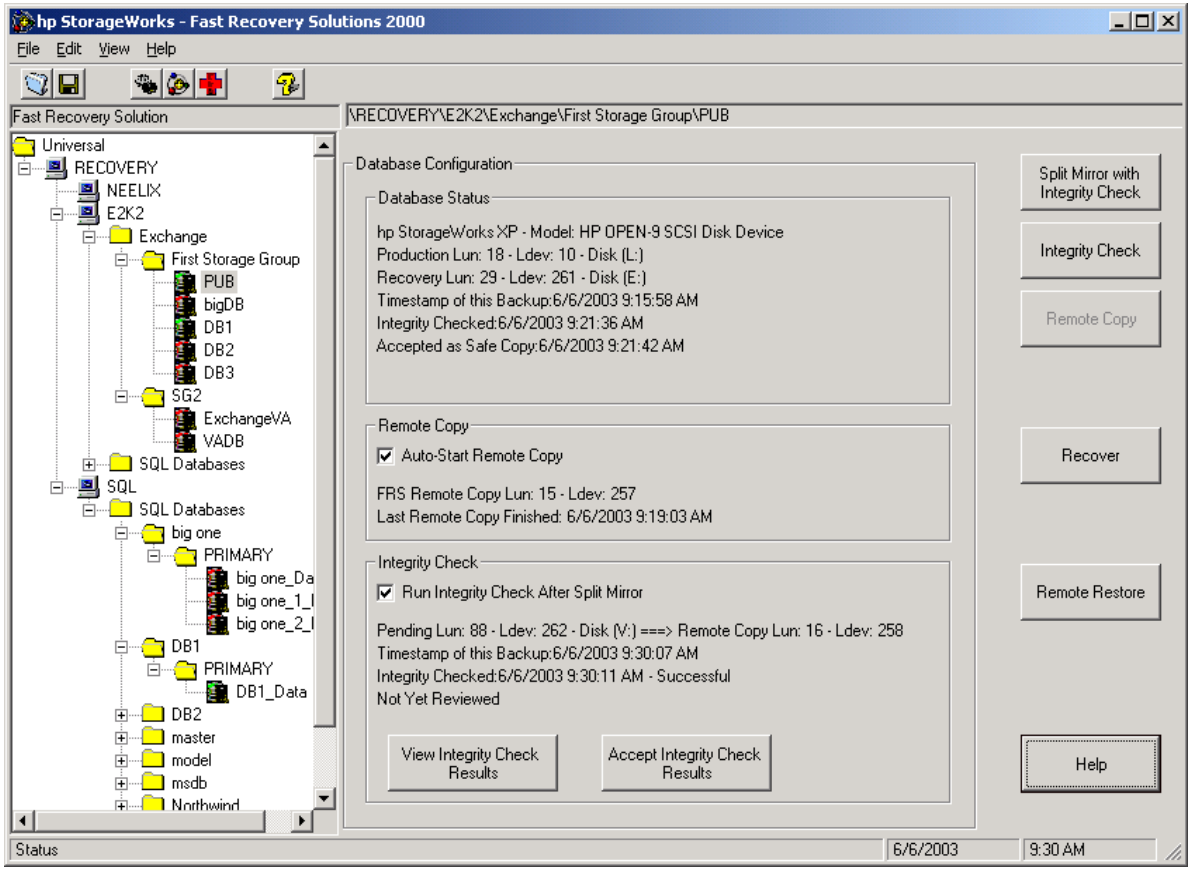
(XP arrays only) HP StorageWorks Continuous Access (CA) software must be installed on the disk array to use the remote copy feature.

For each recovery LUN maintained by FRS, there can be a corresponding remote LUN for disaster recovery purposes. This remote LUN must be created and paired manually by using the Continuous Access software.

After you have established the remote pair manually, FRS will detect it and present expanded features for the maintenance of the remote LUNs on the FRS GUI.

Just as you need to do an initial FRS split mirror backup to the local recovery LUNs, you need to execute an initial FRS split mirror backup to the remote recovery LUNs.

The following example shows the new GUI features that appear when remote copy is being used.



If you check the **Auto-start Remote Copy** box, at the end of every successful split mirror backup FRS updates the remote copy of that LUN. Unchecking this box enables the **Remote Copy** box, which allows you to resync the remote copy at will, independent of a split mirror backup of the production LUN.

If both the Auto-Start Remote Copy box and the Run Integrity Check after Split Mirror box are checked, events occur in the following sequence:

1. The split mirror backup is done to the local recovery LUN.
2. The integrity check runs automatically after the split mirror backup.
3. The administrator views and accepts the integrity check.
4. After the integrity check has been accepted, the remote copy operation begins.

When the copy is complete, the icon next to the database turns green, indicating that it is available for a new action.

When the remote copy is complete, the **Remote Restore** button displays. Now a fast recovery can be executed, if needed, from the remote LUN.

Recovery from the local recovery LUN during a remote copy

If necessary, you can execute a recovery while a remote copy is in progress. Executing a recovery from the local recovery LUN immediately cancels the remote copy in progress, regardless of its current state. This action leaves the remote copy in an unstable state. Consequently, it must be re-created from the original production LUN to make it stable and usable.

Recovery from the remote recovery LUN

If there is a remote LUN and FRS has created at least one split mirror backup to it, a Recovery From Remote LUN button is available on the right side of the FRS window. In the event the local recovery LUN is corrupt and a remote recovery is needed, highlight the database that needs recovery and click **Recovery From Remote LUN**.

This method of recovery invalidates the local recovery LUN. You will need to do a split mirror backup to the local recovery LUN to make it valid and usable.

Checking integrity

Before using the integrity check feature of FRS, see “Requirements for integrity checks” (page 33). There are two integrity check methods:

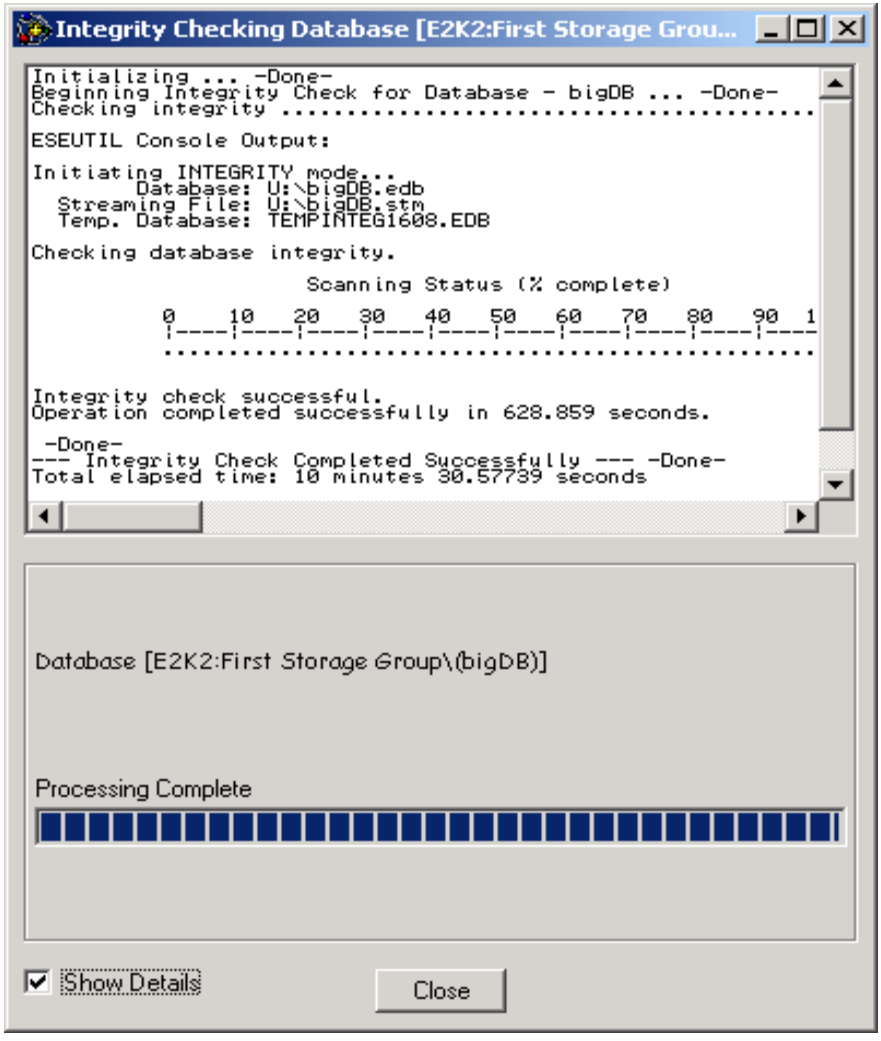
- Automatic integrity check after split mirror backup

  This method is known as the “safe copy” method because it retains the previous known good copy of the database. The safe copy of the database is not overwritten until the integrity check is accepted. This method consumes twice the recovery disk space because two recovery LUNs are required for each production LUN.

- Manual integrity check independent of split mirror backup

Either method produces an integrity check progress window, as well as an integrity check report that can be viewed by an administrator and accepted.

When the integrity check results are accepted, the GUI is updated with information about the integrity check. If you are using the automatic integrity check after split mirror backup, accepting the results of the integrity check causes a warning to display, alerting you that the pending LUN will be promoted to recovery-ready status.


Integrity Checking Database [E2K2:First Storage Grou...
Initializing ... -Done-
Beginning Integrity Check for Database - bigDB ... -Done-
Checking integrity .....
ESEUTIL Console Output:
Initiating INTEGRITY mode...
Database: U:\bigDB.edb
Streaming File: U:\bigDB.stm
Temp. Database: TEMPINTEG1608.EDB
Checking database integrity.
Scanning Status (% complete)
0 10 20 30 40 50 60 70 80 90 1
Integrity check successful.
Operation completed successfully in 628.859 seconds.
-Done-
--- Integrity Check Completed Successfully --- -Done-
Total elapsed time: 10 minutes 30.57739 seconds
Database [E2K2:First Storage Group\(bigDB)]
Processing Complete
Show Details
Close

Automatic integrity check after split mirror backup

If the Integrity Check box is checked in the GUI, the integrity check requires twice the disk space to preserve the previous known good copy of the recovery databases. Using this method maintains a safe copy of the database that can be recovered to the production server if needed, while the newest copy of the data is checked for integrity before becoming the recovery-ready copy.

As mentioned, if you are using this method, you must designate additional disk space on the recovery server. For each production LUN that will be managed by FRS in this way, two identically sized LUNs must be assigned to the recovery side. The second recovery LUN is configured exactly like the first.

EVA and XP disk arrays

For EVA and XP disk arrays, the LUN requires an **hpfrs** label.

VA disk arrays

For VA disk arrays, CommandView SDM must be used to create additional business copies.

Manual integrity check independent of split-mirror backup

If the integrity check box is not checked, copies of the database are automatically promoted to recovery-ready status. If you click **Integrity Check**, FRS checks the recovery-ready copy. This method uses only one recovery LUN for each production LUN and does not maintain a known good, recovery-ready copy (the “safe” copy mentioned above) of the database at all times.

Executing a recovery

Regardless of the array type or backup method, the starting point for a database recovery requires backup copies of the databases residing on the recovery server (an initial pair has already been created by using FRS).

Recovery operations can be executed as often as needed, provided there is sufficient time between actions for the database to return to a “not locked” status.

For Exchange 2000 you can choose to execute a recovery with or without log replay.

Exchange 2000 recovery without log replay

To recover an Exchange 2000 database without log replay:

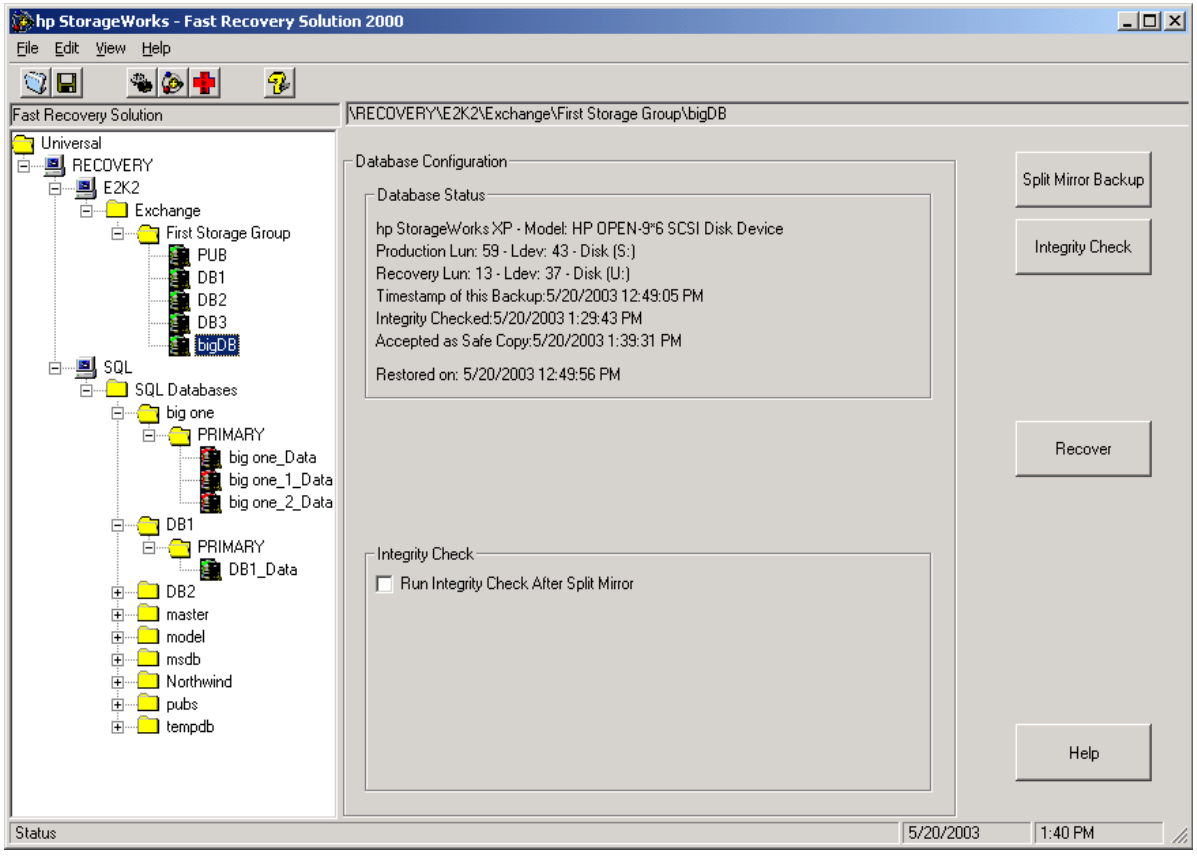
1. From the FRS main window, select the database to be recovered from the left panel. The Database Configuration section then displays all information about the LUNs for that database.
2. Click **Recover**.

   A popup message asks whether log replay is required.
3. Click **No** to decline log replay.

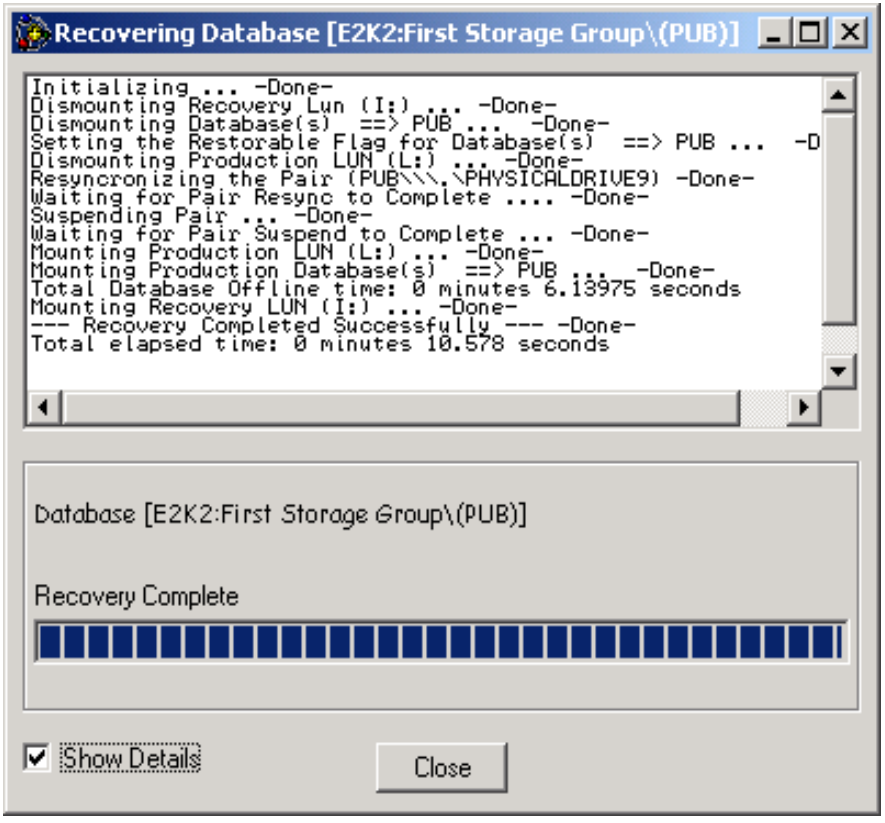
   Log replay will be disabled until the next split mirror backup has been completed for that database.
4. Click **OK** to begin recovery without log replay, or click **Cancel** to return to the GUI.

Caution *If multiple databases within a storage group reside on one LUN, all the databases in that storage group will be replaced with the recovery databases. If no log replay is chosen, the entire storage group is brought back to the point of the last backup. If each database resides on its own LUN, only the database chosen for recovery will be rolled back to the point of last backup.*

In the following example, if a recovery were to be executed for the database **bigDB**, recovery LUN 13 would be recovered back to the production LUN 59.



This example shows the progress window for recovery of the database **PUB** of server **E2K2**



When the recovery is complete, close the recovery window. After you close the window, the database is available for further backup/recovery/integrity check actions.

Upon completion of the recovery, the Database Configuration section of the GUI changes to reflect the new “restored on:” date. As with backups, you can perform recoveries as often as necessary and you can execute them in parallel, if needed.

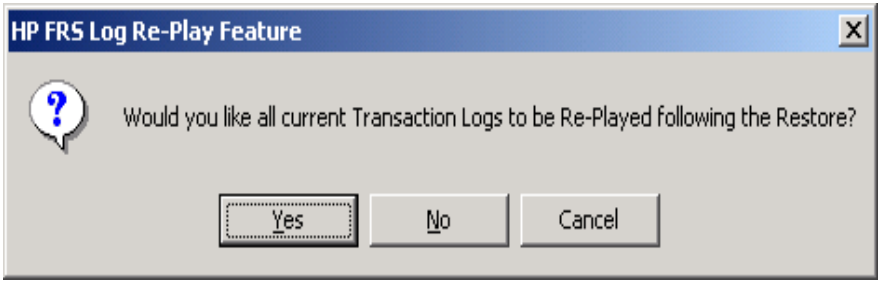
Exchange 2000 recovery with log replay

To recover an Exchange 2000 database with log replay:

1. In the FRS main window, select the database to be recovered from the left panel. The Database Configuration section then displays information about the production and recovery LUNs for that database.
2. Click **Recover**.

   The **Recover** button is enabled only if a split mirror backup has previously been completed by FRS and if no other actions are in progress for that database.

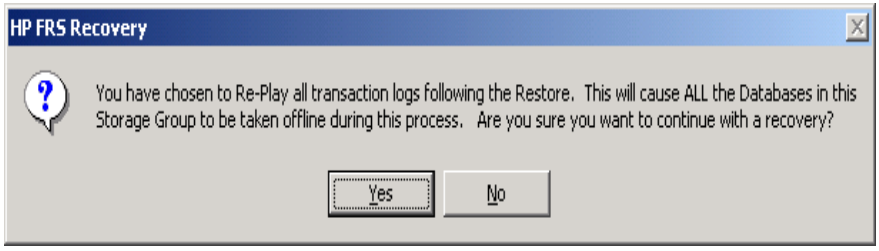
   A popup window asks for confirmation.



3. Click **Yes** to confirm that you want to replay the transaction logs.

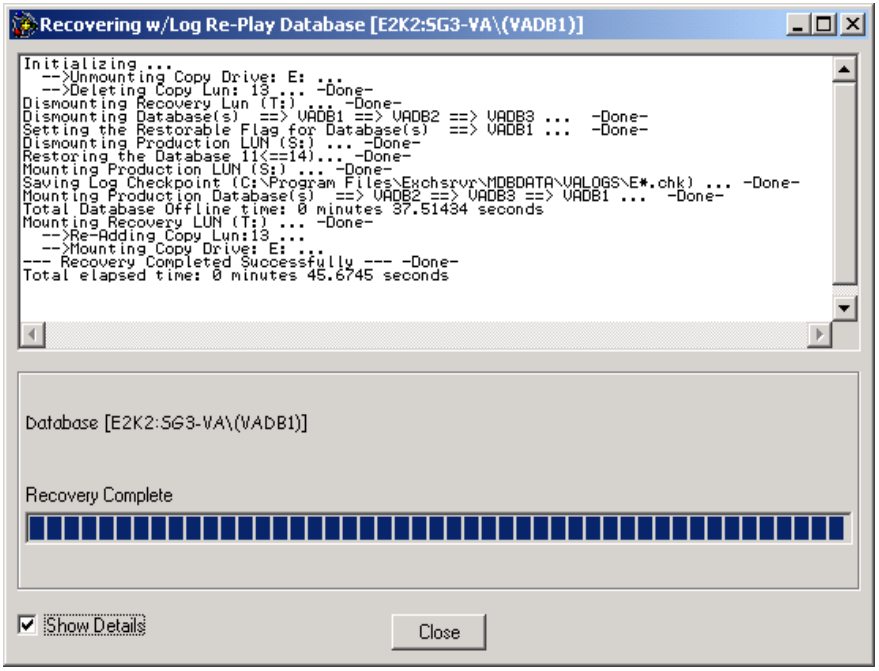
   The recovery process dismounts all databases in the storage group.

   A popup window asks for confirmation.



4. Click **Yes** to confirm that you want to dismount all databases and begin the recovery process.

The following example shows the progress of a recovery for database VADB1.



The amount of time required for restoring the database depends on the number of logs to be replayed.

On completion of the recovery, all databases are remounted and access is restored.

SQL 2000 recovery without log replay

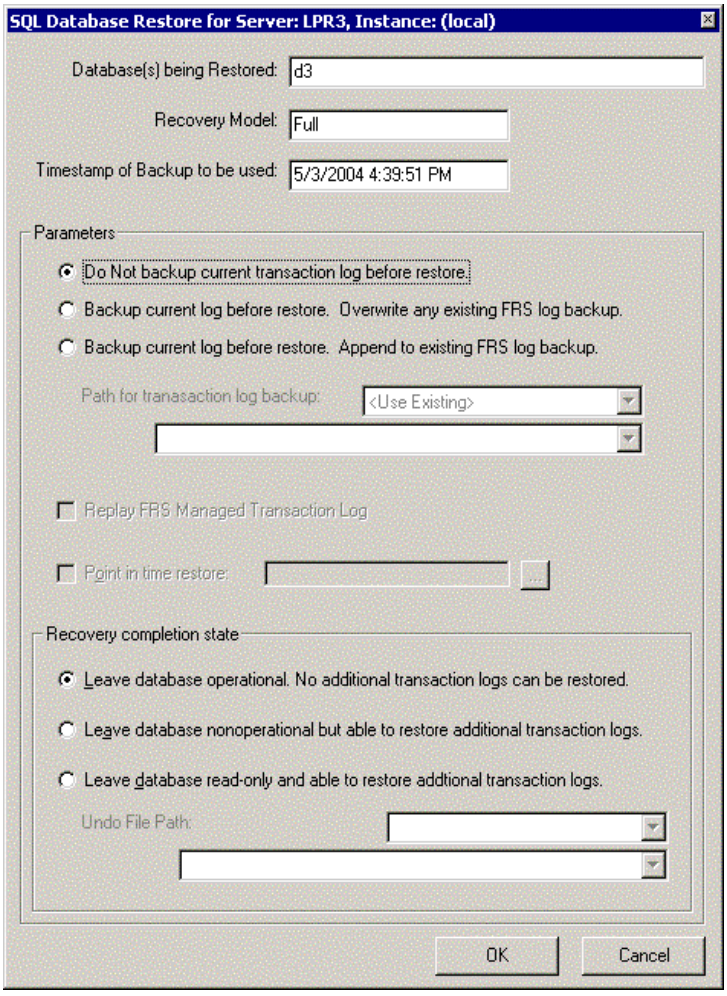
To recover a SQL database without log replay:

Caution *SQL recovery should be done only by an administrator familiar with the Microsoft SQL 2000 recovery options and log management.*

1. In the FRS main window, select the database to be recovered from the left panel. The database configuration section of the FRS GUI displays information about the LUNs for that database.
2. Click **Recover**.

   The SQL Database Restore window opens with recovery options for the database. This window is generated based on options that SQL server offers during a standard SQL 2000 database recovery.

   Although various recovery completion state options are available, the procedure below leaves the database in an operational state.

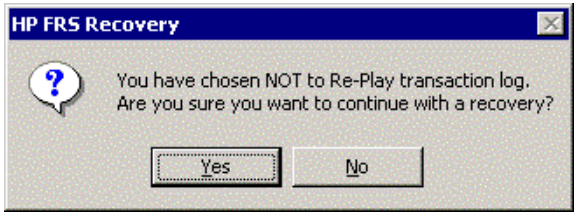


3. To disable log replay, leave the **Replay FRS Managed Transaction Log** checkbox unchecked.

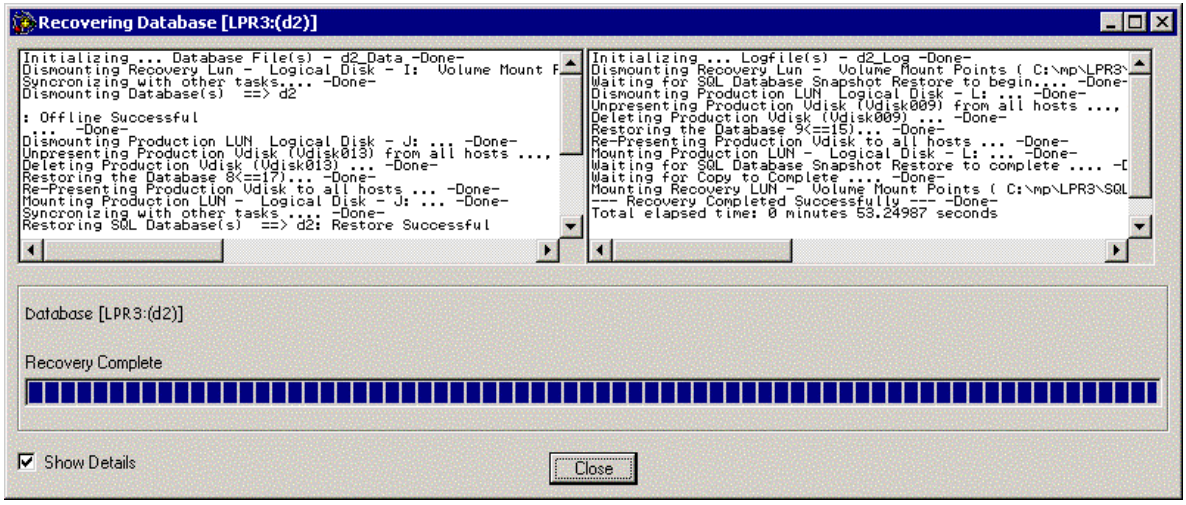
   Whether you select log replay or not, you can back up the current log before the restore by overwriting or appending an existing FRS log backup.

   If you choose the option to back up the current log before restore, you must specify a location for the log. Use the drop-down menu to choose a location where the log should be saved.

4. Click **OK**. A message window reminds you that you have selected a recovery with no log replay.



5. Click **Yes**. A Recovering Database progress window shows the actions of the FRS database recovery with no log replay.



Upon completion of the recovery, the database will be online and current to the point of the last FRS backup.

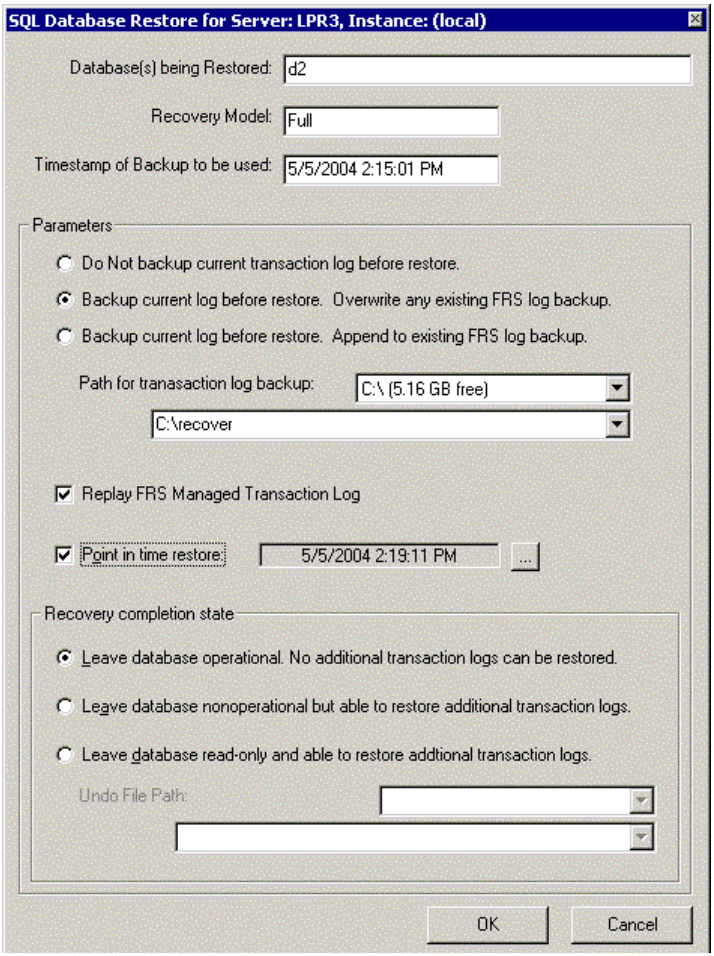
Recovery Completion State

FRS offers standard SQL 2000 options for leaving the restored database in various states. This allows the SQL administrator further log management capabilities after a restore.

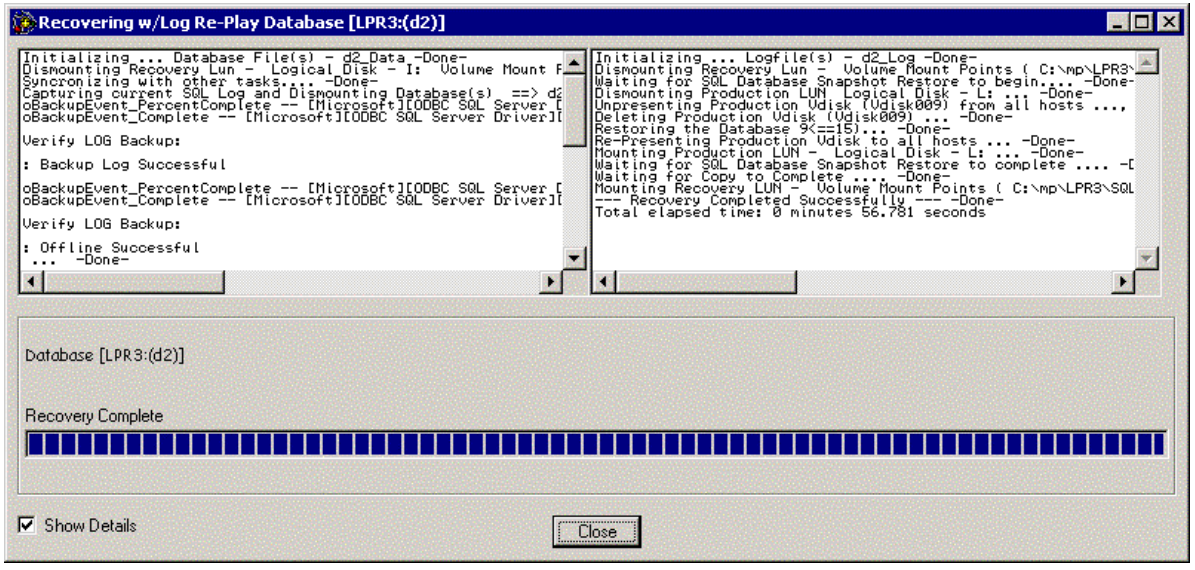
SQL 2000 recovery with log replay

To recover a SQL 2000 database with log replay:

1. In the FRS main window, select the database to be recovered from the left panel. The database configuration section of the FRS GUI displays information about the LUNs for that database.
2. Click **Recover**. The SQL Database Restore window displays recovery options for the database.This window is generated based on options that SQL server offers during a standard SQL 2000 database recovery. Although various recovery completion state options are available, the procedure below leaves the database in an operational state.



3. Check the **Replay FRS Managed Transaction Log** button.
4. Check the **Point in time restore** checkbox and enter a time to restore. By default the restore time is the current time and date; however, you can enter any valid time and date.
5. Click **OK.** A message window indicates a database recovery with log replay has been selected.
6. Click **Yes** to start the recovery with log replay. A Recovering w/Log Replay Database progress window shows the actions of the SQL database recovery with log replay.



When the recovery finishes, the database is online and current to the point specified in **Point in time restore**.

Recovery Completion State

FRS offers standard SQL 2000 options for leaving the restored database in various states. This allows the SQL administrator further log management capabilities after a restore.

Options

From the View menu, select **Options** to change the following preferences for maintenance and recovery operations:

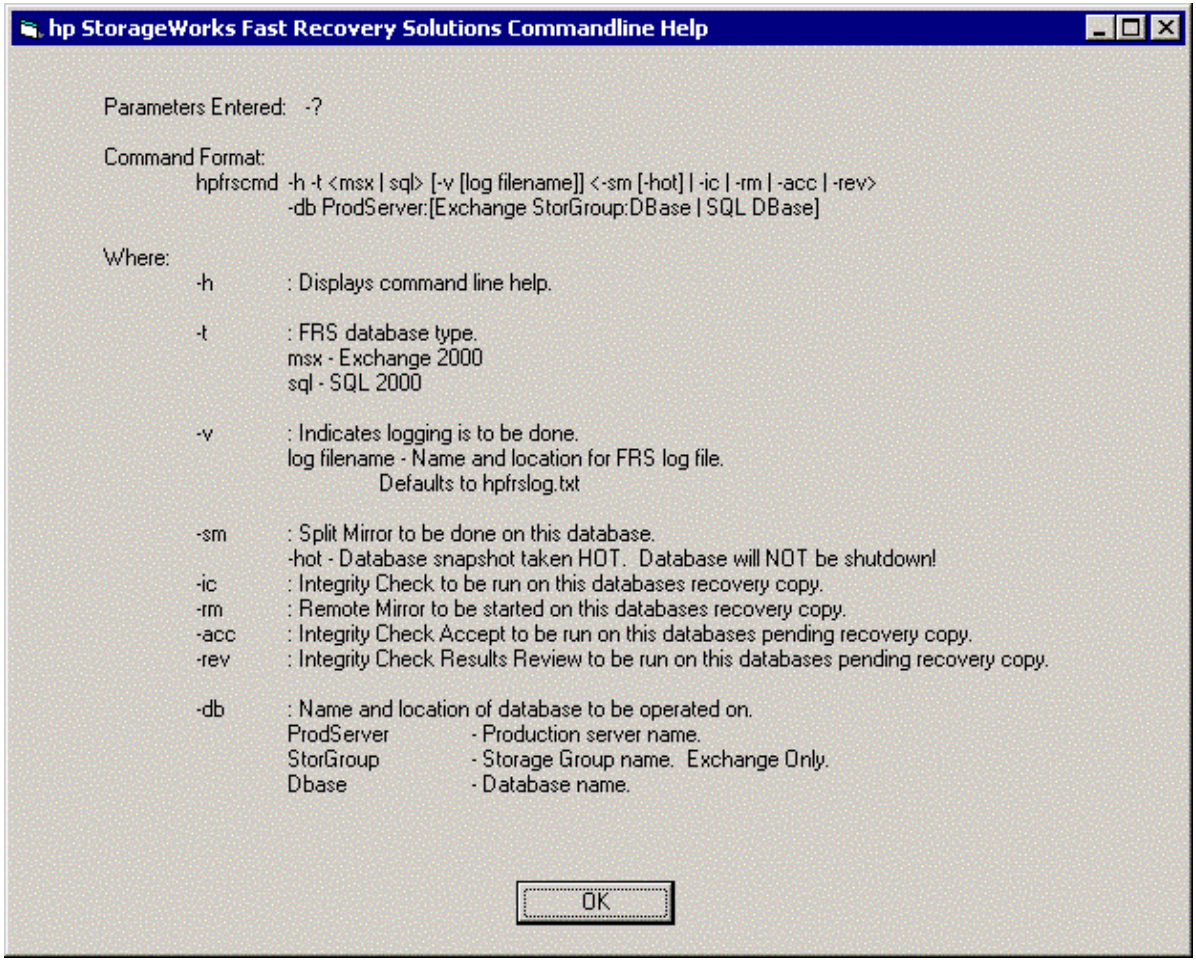
- whether the **Start** button must be clicked before a backup or recovery will start
- whether the backup and recovery actions are followed step by step in the backup/recovery window
- whether the database is automatically remounted in Exchange
- whether the backup/recovery window must be manually closed after an action is complete
- whether to wait for the remote copy to be completed, which displays a progress window if the box is checked

Command Line Interface

FRS provides command line control of split mirror backups, integrity checks, and remote copies.

At the command prompt, change (using **cd)** to the directory where FRS is located. The default location is **C:\program files\Hewlett-packard\frs**.

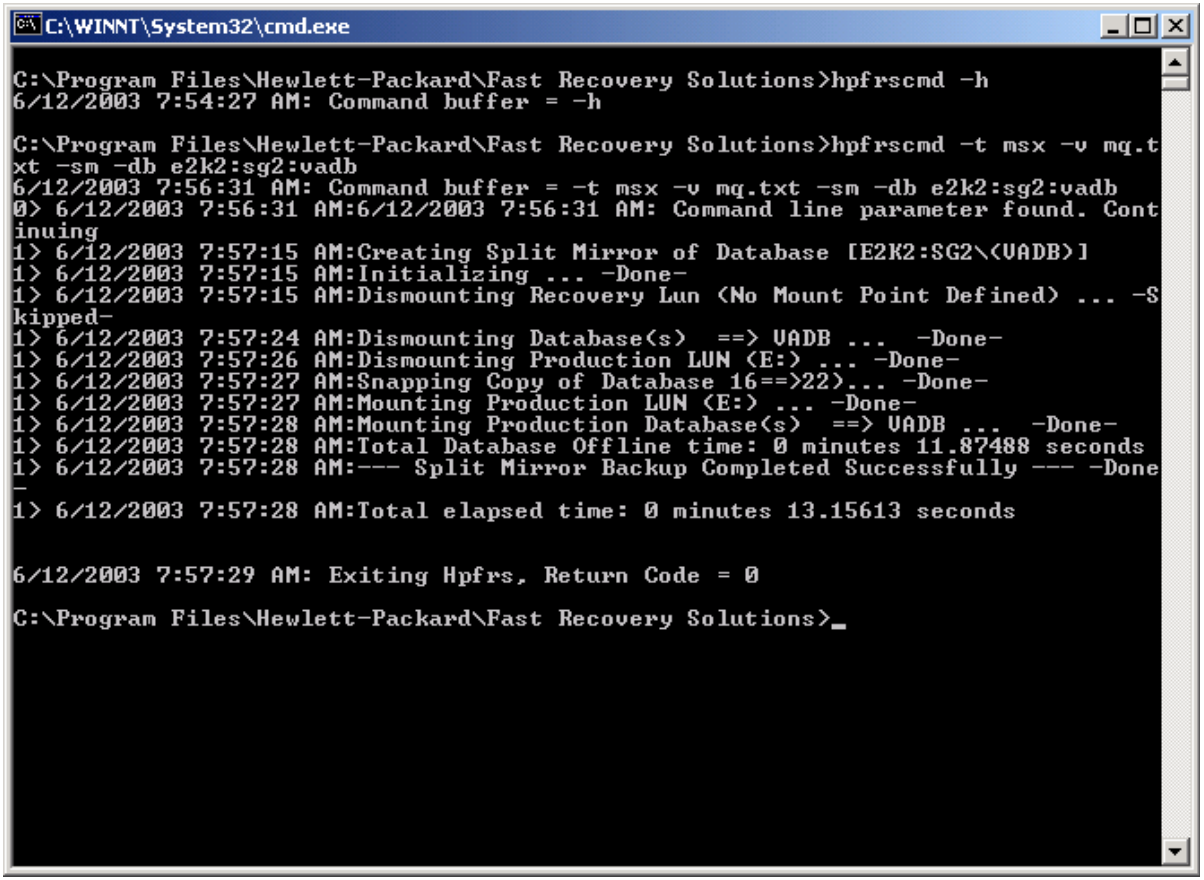
hpfrscmd –h displays a help window with all FRS commands.



Use the **-acc** switch to accept an integrity check that you ran previously. After you accept the integrity check, FRS promotes the pending FRS copy to the recovery-ready FRS copy.

Important Always view the results of the integrity check before accepting them. There is no way to roll back a corrupt database that has been promoted to recovery-ready status.

The following example shows the verbose output of a command line issued split mirror backup on the database **VADB**. This database resides on the server **E2K2** in the storage group **SG2**.



If you specify an FRS log text file with the **–v** option, it will be saved in the HP Fast Recovery Solutions directory.

You cannot run FRS command line entry and the FRS GUI at the same time. After you have started an action by command line entry, you cannot open the GUI until the action is complete.

5

Using HotSplit backup

This chapter explains how to use the HotSplit backup feature of FRS for Exchange 2000. The following topics are covered:

- Enabling the HotSplit feature
- Creating a HotSplit backup
- Recovering a HotSplit database

Enabling the HotSplit feature

FRS lets you “hot split” Exchange 2000 databases as an option to the split mirror backup feature. The HotSplit option creates copies of the production Exchange database while the database continues to run. This provides a no-downtime solution for split mirror backups.

To enable the HotSplit function from the FRS main window:

1. Click **File**, click **Overrides**, and click **Enable HotSplits**.

The following User agreement and Warning information displays, explaining the potentially unstable nature of HotSplits:

Hot Split Use Agreement

WARNING: Activation may result in Database Corruption!

Please read the following carefully. To activate the "HotSplit" capability you must read and accept this agreement.

WARNING! Activating the "HotSplit" option is NOT recommended or encouraged by either HP or Microsoft. Additionally, this option will force the automatic Integrity Check option to be enabled for all Exchange databases which will require double the disk storage to be available before it can be used.

IMPORTANT: READ CAREFULLY - Using the "HotSplit" feature in FRS may cause database corruption when restored by FRS. Log files must be protected outside of FRS and each time they are truncated a new "HotSplit" copy MUST be taken to continue FRS protection. It is also highly recommended that a recent tape backup has been taken prior to using the "HotSplit" feature and that this tape backup has been verified to be consistent and recoverable.

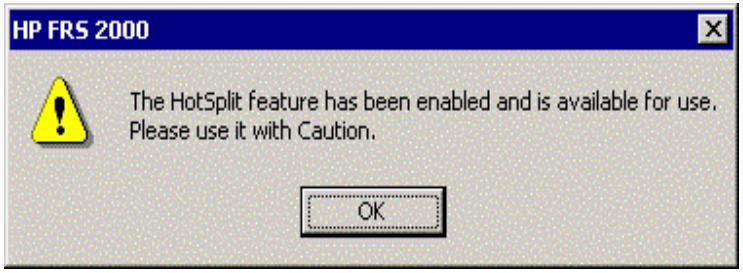
By agreeing to this, the user of the "HotSplit" feature accepts responsibility for its use and understands the risks involved with using this feature.

Additionally user understands and agrees that

EXCEPT TO THE EXTENT PROHIBITED BY LOCAL LAW, IN NO EVENT WILL HP OR ITS SUBSIDIARIES, AFFLIATES, DIRECTORS, OFFICERS, AGENTS OR SUPPLIERS BE LIABLE FOR DIRECT, INDIRECT, SPECIAL, INCIDENTAL, CONSEQUENTIAL, PUNITIVE, OR OTHER DAMAGES (INCLUDING LOST PROFIT, LOST DATA, OR DOWNTIME COSTS), ARISING OUT OF THE USE, INABILITY TO USE, OR THE RESULTS OF USE OF THE SOFTWARE, WHETHER BASED IN WARRANTY, CONTRACT, TORT, OR OTHER LEGAL THEORY, AND WHETHER OR NOT HP WAS ADVISED OF THE POSSIBILITY OF SUCH DAMAGES.

2. Click the **I Accept** button to turn on HotSplit capabilities if you understand and accept the use agreement.

   The following message confirms that HotSplit is enabled:



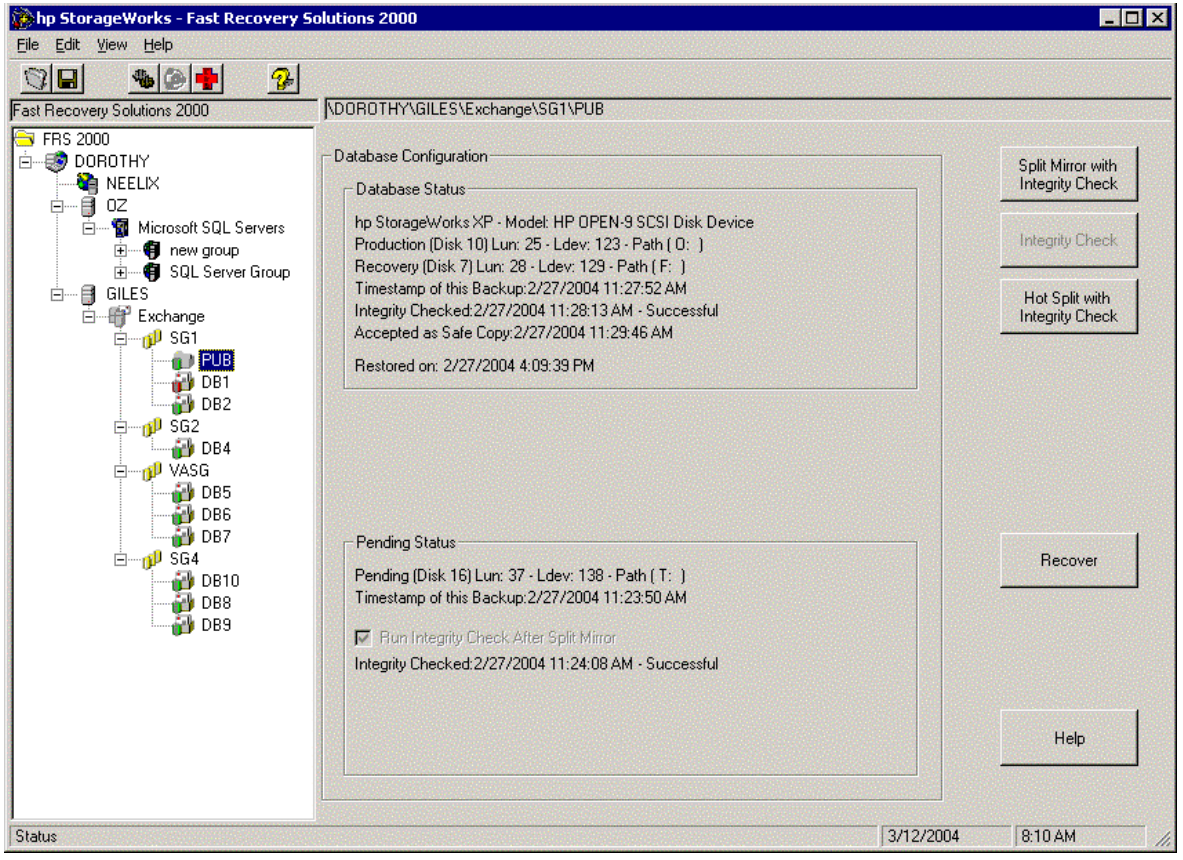
   Once this feature has been enabled, a new button becomes available on the FRS main window for the execution of HotSplits for Exchange databases.

Creating a HotSplit backup

The HotSplit backup feature requires two recovery LUNs for each production LUN managed by the HotSplit feature. One recovery LUN is the recovery-ready LUN, while the other is the pending copy. The pending copy becomes recovery-ready only after you run an integrity check against the database and then view and accept the integrity check.

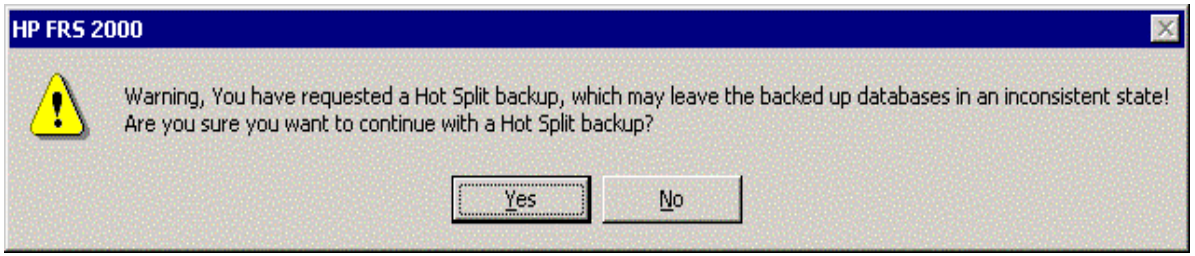
To execute a HotSplit on an Exchange database:

1. Select the database you want to HotSplit.



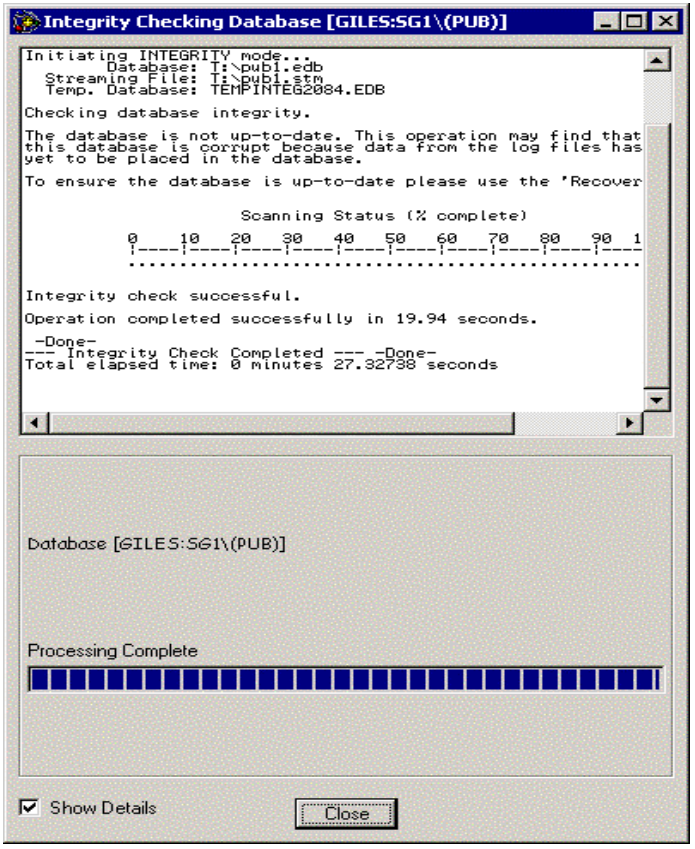
2. Click the **Hot Split with Integrity Check** button.

The following message warns you of the risks in using HotSplit.



3. Click **Yes** to start the HotSplit.

   A progress window shows the HotSplit processing as it occurs. An integrity check automatically runs following the HotSplit. The integrity check may return as "failed." This is not unusual and occurs because an open Exchange database is inconsistent by definition.



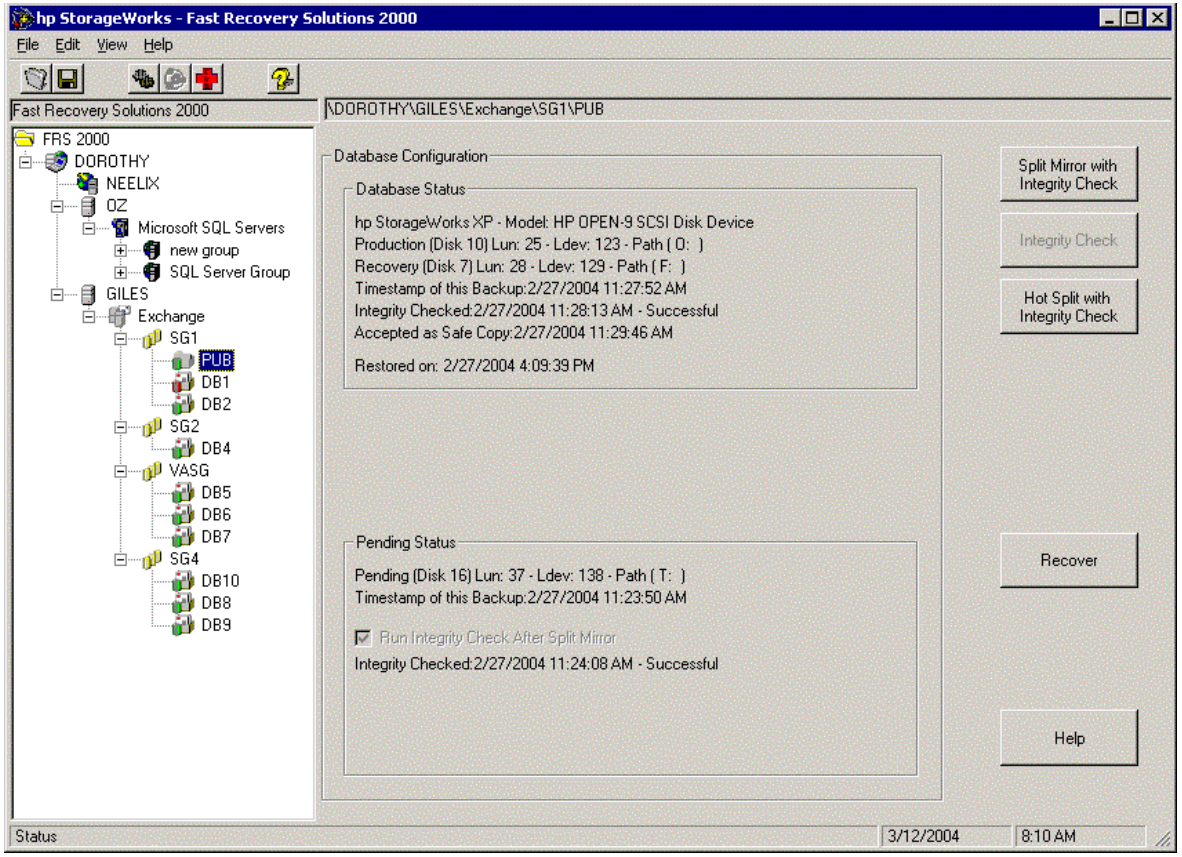
4. Click **Close** when the progress indicator shows that processing is complete.
5. View the results of the integrity check before you accept them.
6. Accept the integrity check.

   When you accept the integrity check, the new data copy becomes the recovery-ready copy. This is the copy that will be used for recovery in the event of corruption of the production database.

Recovering a HotSplit database

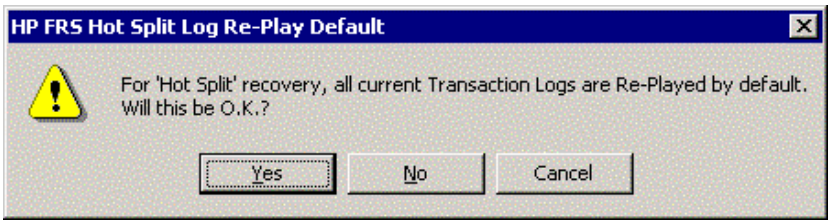
To recover a database that has been previously HotSplit:

1. Select the database to be recovered.



2. Click the **Recover** button.

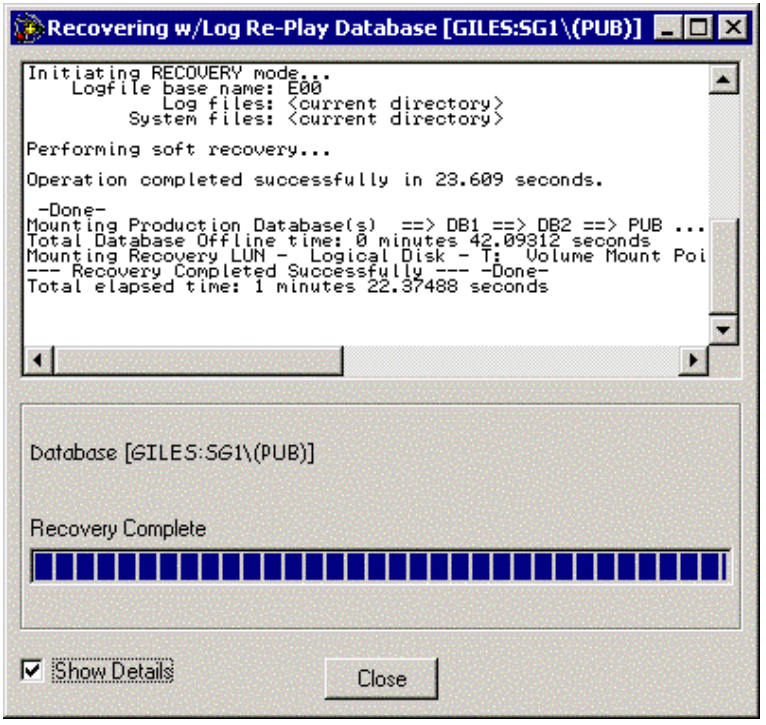
The following message displays, asking if you want to replay the log:



3. Click **Yes**. This step is not required but is strongly recommended when you recover a HotSplit database.

   A warning message indicates that all databases within the target storage group will be taken offline during the recovery in order to do soft recovery and log replay.

   A progress window shows the recovery as it occurs:



   The progress window indicates a soft recovery is being performed. After recovery of a HotSplit database, a soft recovery is required to

bring the data back to a consistent state before mounting it in Exchange. This process dismounts all databases in the storage group.

4. Click **Close** to close the recovery window when the recovery process is complete.

   All production databases are now back online.

6

Troubleshooting

This chapter includes the following topics:

- FRS error messages
- Product support information

FRS error messages

This section describes recommended actions for messages, errors, and warnings displayed by FRS during the following operations:

- Maintenance
- Recovery
- Terminating processes
- Integrity checks

Maintenance

Error `Dismounting the local/remote drive failed. Please close any open files on that drive and select retry to try again, select ignore to ignore the error and continue, or select abort to cancel the operation.`

FRS cannot dismount a file system drive if it detects any activity on it. This could cause data inconsistency, so FRS waits until all files on that drive are closed before dismounting the drive. Confirm that all files are closed, and select retry.

If the problem is with the remote drive, confirm that connectivity to the remote machine is intact and that there are no network issues preventing FRS from communicating with the remote server.

Error `Mounting the remote drive failed. Please select retry to try again, select ignore to ignore and continue, or select abort to cancel the operation.`

FRS cannot remount the drive if the connection to the production server has been lost. Confirm that connections are intact and that the recovery server can ping the production server. Then retry.

Warning `Are you sure you want to continue with a split mirror backup?`

After the split mirror backup is started, it cannot be stopped without jeopardizing the integrity of the database. Both the recovery and production database being backed up are inaccessible for a short time during this period. If a split mirror backup is initiated when the production database is damaged, known good recovery databases are overwritten with the damaged one. (Using the integrity check/safe copy feature of FRS can eliminate this potential issue.)

Warning `No LUN's of appropriate size found. Cannot continue.`

LUNs must be configured on the recovery server for use by FRS and conform to these criteria:

- the **HPFRS** label
- same size as the production LUNs

If LUNs are available, but they are not the same size as the production LUNs, FRS cannot pair them. Assign more LUNs of the same size as the production LUNs.

Recovery

Error

```
Failure setting the database restore flag. Please
select retry to try again.

Failure resetting the database restore flag. Please
select retry to try again.

Failure querying the database restore flag. Please
select retry to try again.
```

If FRS cannot communicate with the Exchange server, it cannot manipulate the restore flag. Check connectivity to the production server. Confirm that all Microsoft services are online.

Error `This operation cannot be completed. Pair needs to be in suspended state to run recovery.`

The **Recovery** button is enabled only if a split mirror backup has been done in the past and the pair has been created using FRS. This error occurs if the pair has been manually split at the disk array.

Error `This operation cannot be completed, no recovery LUN available`

The **Recovery** button is enabled only if a split mirror backup has been done in the past and the pair has been created using FRS. This error occurs if a pair has been manually deleted at the disk array and then a recovery is attempted.

Message `Are you sure you want to continue with a recovery?`

After a recovery is started, it cannot be cancelled until the recovery is completed. The production database will be replaced by the recovery-ready database.

Terminating processes

Message `Operation cannot be cancelled. . .`

Closing either the GUI or the progress window for a split mirror backup or a recovery would cause FRS to leave the database in an unknown state. For this reason, FRS does not allow windows to be closed while these actions are in progress. If you forcibly cancel the process through the operating system (for example, Task Manager), the integrity of the database cannot be guaranteed and FRS and the disk array may have conflicting information about the databases.

Integrity checks

Warning `By accepting this integrity check the recovery volume will be replaced by the safe copy volume.`

Before accepting the copy, examine the output of the integrity check. Do not accept the integrity check unless you have confirmed that it is a good copy of the database. After the integrity check is accepted, the former

recovery-ready volume becomes the pending copy that is used for the next backup/integrity check.

Warning `Activating Automatic integrity checks following a split mirror backup consumes double the disk storage.`

Automatic integrity checks require two secondary (copy) volumes for each primary (source) volume. One is the pending copy that is integrity checked. Then after it is accepted as good, it becomes the known good recovery-ready copy. A second LUN is required for the next backup. The recovery-ready copy of the database is never overwritten by the new copy until the new copy has been integrity checked and accepted. In this way, there is always at least one known good recovery-ready copy of the data.

Product support information

For additional information about installing, implementing, or maintaining FRS, contact your HP representative.

Glossary

BC	HP StorageWorks Business Copy XP. BC lets you maintain up to nine local copies of logical volumes on the disk array.
CA	HP StorageWorks Continuous Access XP. CA lets you create and maintain duplicate copies of local logical volumes on a remote disk array.
cluster	The concept of linking individual servers physically and programmatically and coordinating communication between them so they can perform common tasks.
DCOM	Windows distributed component object model.
EVA	HP StorageWorks Enterprise Virtual Array.
failover	Process that automatically shifts the workload from one server in a cluster to another server in the event of a failure.
FRS	HP StorageWorks Fast Recovery Solutions.
FRS server	The server where copies of the production database are staged and managed. The FRS server runs the FRS GUI.
HotSplit	A feature that creates copies of a production Exchange database while the database continues to run.
LDEV	Logical device. An LDEV is created when a RAID group is divided into pieces according to a selected host emulation mode (that is, OPEN-3, OPEN-8, OPEN-9, etc.). The number of resulting LDEVs depends on the

	selected emulation mode. The term LDEV is often used synonymously with the term volume.
LUN	Logical unit number. A LUN results from mapping a SCSI logical unit number, port ID, and LDEV ID to a RAID group. The size of the LUN is determined by the emulation mode of the LDEV, and the number of LDEVs associated with the LUN. For example, a LUN associated with two OPEN-3 LDEVs will have a size of 4,693 MB.
online backup	Backup while Exchange services are still running. There is no interruption in services for backup.
P-VOL	The primary or main volume that contains the data to be copied.
production server	Exchange 2000 or SQL 2000 server.
RAID	Redundant array of independent disks.
recovery server	FRS server. The server where copies of the production database are managed.
S-VOL	Secondary or remote volume. The copy volume that receives data from the primary volume.
Snapclone	Secondary copies of the databases that are created using the EVA storage appliance.
split mirror backup	Also called off-line backup, because it is performed after a normal database shutdown. All data files and control files are consistent to the same point in time. Used in environments where it is possible to take services off-line for short periods every day to do backup.
VA	HP StorageWorks Virtual Array.
XP	HP StorageWorks Extended Performance Array.

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